

POLIO GLOBAL
ERADICATION
INITIATIVE

Annual Report
2009

EVERY
LAST
CHILD



World Health
Organization



CDC

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Photos: Front cover: On 25 May, 2009, a displaced boy sits near the ruins of mud dwellings that previously provided shelter for Afghan refugees, in Jalozaï Camp, North-West Frontier Province. By 27 June, more than 1.9 million Pakistanis in NWFP had been displaced by conflict. © Marta Ramoneda/UNICEF; Back cover: © Richard Wainwright/Jersey Rotary.

POLIO

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The game-changing bivalent oral polio vaccine is used for the first time ever in Jalalabad, eastern Afghanistan, in December 2009.

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Acronyms and Abbreviations

ACPE	Advisory Committee on Poliomyelitis Eradication
AFP	Acute flaccid paralysis
aVDPV	Ambiguous vaccine-derived poliovirus
bOPV	Bivalent oral polio vaccine
CDC	US Centers for Disease Control and Prevention
CHD	Child Health Days
cVDPV	Circulating vaccine-derived poliovirus
EPI	Expanded Programme on Immunization
GAVI Alliance	Global Alliance for Vaccines and Immunization
GAPIII	Third edition of the Global Action Plan to minimize post eradication poliovirus facility-associated risk
GCC	Global Commission for the Certification of the Eradication of Poliomyelitis
GFIMS	Global Framework for Immunization Monitoring and Surveillance
GIVS	Global Immunization Vision and Strategy
GPEI	Global Polio Eradication Initiative
GPLN	Global Polio Laboratory Network
IFFIm	International Finance Facility for Immunization
IHR (2005)	International Health Regulations (2005)
IPV	Inactivated polio vaccine
ITD	Intratypic differentiation laboratory
iVDPV	Immunodeficiency-associated vaccine-derived poliovirus
mOPV	Monovalent oral polio vaccine
NCC	National Certification Committee
NGO	Non-governmental organization
NIDs	National Immunization Days
OPV	Oral polio vaccine
RCC	Regional Certification Committee
RED	Reaching Every District
SAGE	Strategic Advisory Group of Experts on Immunization
SIAs	Supplementary Immunization Activities
SNIDs	Sub-national Immunization Days
tOPV	Trivalent oral polio vaccine
UNICEF	United Nations Children's Fund
VAPP	Vaccine-associated paralytic polio
VDPV	Vaccine-derived poliovirus
VPD	Vaccine-preventable diseases
WHA	World Health Assembly
WHO	World Health Organization
WPV	Wild poliovirus

1. Executive Summary

FOR the Global Polio Eradication Initiative (GPEI), 2009 was a pilot year: an irony for a 20-year effort, but one that breathed innovation and fresh thinking into the initiative. At the beginning of the year, poliovirus survived in parts of four countries and was causing a large-scale international outbreak for the second time in five years. Poliovirus had – for the first time – re-established transmission in several countries. Noting that the strategies which successfully eradicated polio from 99% of the world were not working in the remaining 1%, the World Health Assembly in 2008 had called on the GPEI to develop new approaches to tackle the surviving reservoirs of wild poliovirus.

In response, the GPEI developed a special one-year *Programme of Work 2009*, embarking on an independent evaluation of the remaining barriers to stopping polio, introducing new strategies to tackle those barriers and evaluating new vaccines to enhance the impact of each contact with a child. The situation had improved enough by the end of the year for the Strategic Advisory Group of Experts on Immunization (SAGE) and the Advisory Committee for Poliomyelitis Eradication (ACPE) to recommend the development of a new, three-year programme of work to exploit these new approaches and urgently interrupt wild poliovirus transmission.

2009 was marked by a type of progress in the polio-endemic countries which had not been seen before. In Nigeria, the unprecedented ownership of the programme by all levels of government, and critically, the traditional and religious leadership, quickly closed vaccination gaps and drove immunization levels upwards, resulting in case numbers falling by more than 99%. India now faces the final surviving genetic chain of type 1 transmission, down from *nine* chains four years ago. Sustained monovalent oral polio vaccine type 1 (mOPV1) campaigns targeted this chain throughout 2009, and the new 107-Block Plan for the remaining blocks with persistent transmission was drawn up and implemented to tackle the ongoing transmission of poliovirus among migrant groups and in the most difficult-to-access areas head on. In Afghanistan and Pakistan, 2009 was marked by repeated military offensives that resulted in the mass movement of internally displaced people, in some cases hampering access to children and in others, opening up areas that had long been inaccessible. Persistent transmission of polio was restricted to 23 districts between the two countries – emphasizing the value of new district-specific approaches.

Of the 15 countries that experienced outbreaks of wild poliovirus in 2009, 10 had stopped transmission by the end of the first quarter of 2010. The 19-country coordinated campaigns in March and April, 2010, along the wild poliovirus “importation belt” of sub-Saharan Africa, solidified a new approach – a series of pre-planned campaigns built on the back of a three-year immunization schedule to raise immunity as a multi-country block to levels required to end the current outbreak and prevent new ones.

In the countries known to have re-established transmission, Chad and Angola, polio-focused staffing levels were escalated to a level matching the endemic countries, and aggressive advocacy efforts have led to a deeper understanding of the threat these nations pose to polio eradication. While by the first quarter of 2010 southern Sudan had not recorded any cases since June 2009, surveillance was intensified throughout 2009 to validate that progress.



Children sit with their mothers, waiting to receive polio vaccine at a health facility in northern Nigeria.

In July and August, an independent evaluation of the major barriers to interrupting poliovirus transmission took place, tasked with evaluating the primary challenges to achieving sufficient population immunity to interrupt poliovirus transmission and identifying area-specific strategies to overcome them. New approaches were proposed and evaluated, and while the *Independent Evaluation* urged against over-confidence, it found that if the managerial, security, and technical issues could be addressed, polio eradication could be achieved.

Four major lessons were realized through the *Programme of Work 2009* and were fundamental to the development of the new *GPEI Strategic Plan 2010-2012*:

- **Lesson 1.** It became clear that wild poliovirus transmission could persist in smaller geographical areas and population sub-groups than previously understood. New area- and issue-specific plans in each endemic country were drawn up – such as India's 107-Block Plan and Afghanistan's Southern Districts Plan – and implemented.
- **Lesson 2.** The national and international spread of wild polioviruses, and risk of subsequent outbreaks, was largely predictable, following identified migration routes and exploiting weaknesses in health systems, facilitating prevention and response activities. This understanding led to the introduction in 2009 of broad, pre-planned, synchronized campaigns across west and central Africa to raise immunity to wild poliovirus across the entire region.
- **Lesson 3.** The population immunity thresholds needed to interrupt polio transmission differed between the remaining infected areas, being higher in Asia than Africa, facilitating a tailoring of strategies to local circumstances.

Wild poliovirus type 1 cases: 479

Wild poliovirus type 3 cases: 1,122

Wild poliovirus type 1&3 cases: 3

Total cases: 1,604

Excludes viruses detected from environmental surveillance and vaccine-derived polioviruses. Data in WHO/HQ as of 1 June, 2009

- **Lesson 4.** Optimizing the balance of administering monovalent oral polio vaccine (OPV) types 1 and 3 had proven more difficult than anticipated, leading to alternating outbreaks of type 1 and 3 poliovirus in certain settings and prompting the fast-track development of the bivalent OPV (bOPV). In December 2009 in Afghanistan, bOPV was used for the first time. Its ability to tackle both surviving serotypes (type 1 and type 3 wild poliovirus) concurrently, with a higher efficacy than trivalent oral polio vaccine, doubles the impact of each campaign.

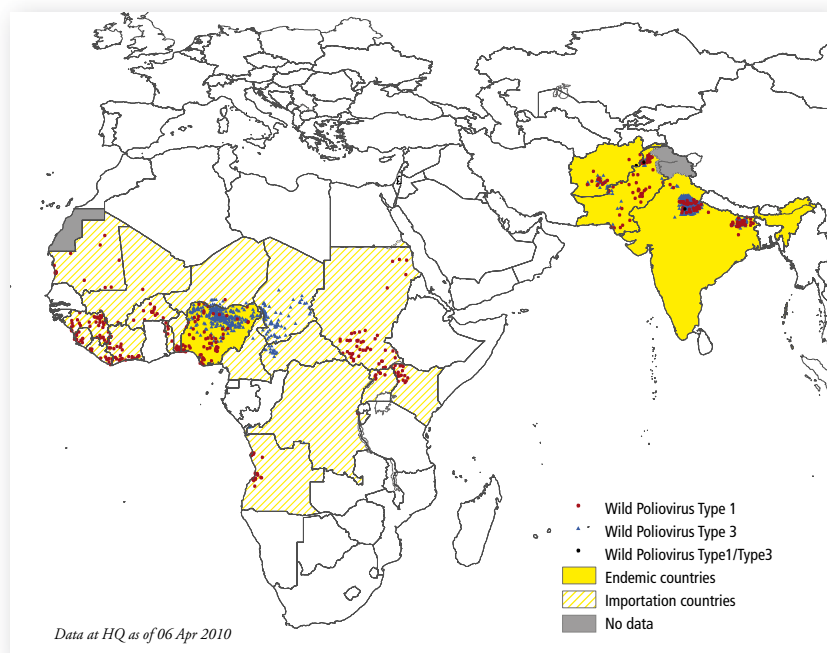
In 2009, the GPEI continued to benefit from high-level political support. On 4 June, US President Barack Obama used his historic Cairo address to the Islamic world to announce “a new global effort with the Organization of the Islamic Conference (OIC) to eradicate polio”. The OIC Secretary-General, in turn, wrote to the heads of state of polio-affected countries in west and central Africa, urging their engagement, and the International Islamic Fiqh Academy issued a strong

statement, appealing to parents, Ministries of Health, religious scholars and mosque leaders to support polio eradication.

By the end of 2009, a financial challenge had emerged to the full implementation of the *GPEI Strategic Plan 2010-12*. The three-year budget for the Strategic Plan is US\$2.6 billion, against which approximately US\$1.3 billion in financing had been secured as of 1 July 2010, requiring a further \$1.3 billion to complete the necessary activities to achieve eradication.

The justification for further financing to complete the job of polio eradication is sound, both from a humanitarian and economic perspective: failure to achieve success will have significant humanitarian and economic consequences. Achieving polio eradication will require a talent for real-world practicality to implement and finance the final steps to eradication. The children who will walk in the next decades will not thank us for starting the job of polio eradication, only for finishing it.

Wild poliovirus cases in 2009



2. Context of the Programme of Work 2009

WHEN the World Health Assembly (WHA) launched the Global Polio Eradication Initiative (GPEI) in 1988, over 125 countries were considered to be endemic for the disease, with an estimated 350,000 children paralysed each year. Global application of the eradication strategies developed in the Americas had by 2004 resulted in the eradication of one of the three serotypes of wild polioviruses (type 2 - last isolated in 1999), a 99% drop in the annual incidence of the disease globally, and the elimination of the remaining indigenous virus serotypes from all but six countries in the world.

After that critical milestone, progress reached a plateau, with persistent transmission of polio in a handful of countries and regular international spread of polio into polio-free areas. Despite the development and widespread use of new monovalent oral poliovirus vaccines in 2005 to enhance the impact of vaccination campaigns, and the intensification of the global eradication effort in 2007, indigenous wild poliovirus type 1 and 3 transmission has continued in geographically limited areas of four countries: Nigeria, India, Pakistan and Afghanistan.

In May 2008, alarmed that polio remained entrenched in these four countries and that an increasing number of polio-free areas were again becoming re-infected, the World Health Assembly (WHA) called for a new strategy to complete polio eradication.

In response, the GPEI developed a one-year programme of work to ensure that a new plan was based on the best possible data and to provide a reporting platform for stakeholders. As such, 2009 marked a 'bridge' year for the GPEI, characterized by clinical trials on new eradication tools, assessments of new strategic approaches for endemic areas, additional activities to limit international spread, and – most importantly – a major independent evaluation. The outcomes and lessons from the year, together with wide consultation with stakeholders, formed the basis for the new multi-year *GPEI Strategic Plan 2010-2012*.

This document reports against the *Programme of Work 2009*.



3. Independent evaluation of the major barriers to interrupting poliovirus transmission

A key component of the *Programme of Work 2009* was the undertaking of a comprehensive independent evaluation of the major barriers to interrupting poliovirus transmission (*Independent Evaluation*).

In January 2009, the Executive Board (EB) to the WHA endorsed the Director-General's proposal to conduct this independent, external evaluation.

The *Independent Evaluation* was chaired by one of the six Vice Chairmen of the Executive Board, and comprised five sub-teams consisting of 28 experts in relevant disciplines including public health, vaccinology, social mobilization and security. The sub-teams collectively spent 24 person-months working on the evaluation in Afghanistan (Kabul and Kandahar), India (Delhi, Bihar and Uttar Pradesh), Nigeria (Abuja, Kano and Zamfara), Pakistan (Islamabad, Karachi, Lahore and Peshawar), Angola (Luanda), Sudan (Juba), the WHO Regional Offices for Africa and the Eastern Mediterranean and WHO Headquarters. The sub-teams consulted widely with partners and stakeholders in each country.

The evaluation team identified cross-cutting and country-specific barriers that would need to be

addressed for polio eradication to succeed. The evaluation team expressed "confidence on the part of the teams that if the managerial, security and technical issues can be addressed polio eradication can be achieved."

To address the major cross-cutting barriers, the evaluation team recommended that – given the complicated administrative structure of the Global Polio Eradication Initiative at global and regional level – key positions be invested with appropriate authority to address suboptimal programme performance; research on target age groups, new oral polio vaccine constructs and inactivated polio vaccine be continued and extended and that promising developments (e.g. bivalent oral polio vaccine) be rapidly scaled up; additional international technical support be allocated to persistently-infected areas on a par to that allocated to endemic areas; and that the GPEI work more closely with immunization systems strengthening to enhance strategy impact in both the pre-eradication and post-eradication eras.

Country-specific recommendations from the *Independent Evaluation* can be read in the sections on each country.



4. Key events 2009

JANUARY



19-27: WHO Executive Board in Geneva calls on Afghanistan, India, Nigeria, and Pakistan to make polio eradication their top operational priority in 2009 and to report to the World Health Assembly (WHA) in May on their progress.

18-25: Rotary International Assembly, San Diego: Bill & Melinda Gates Foundation and Rotary International announce a joint financing commitment of US\$355 million to polio eradication.

FEBRUARY

1-2: Nigeria's Governors issue Abuja Commitments to Polio Eradication. Bill Gates travels to Nigeria to attend the ceremony.



26: Pakistan Prime Minister Syed Yousaf Raza Gillani launches Polio Action Plan, with the immediate aim of assuring inter-sectoral support for polio eradication.

27: Eight-country synchronized vaccination campaign kicks off in West Africa, immunizing 53 million children over four days.

- The Final Inch documentary, depicting the challenges of the final stages of polio eradication, is nominated for an Academy Award in the best documentary short subject category.

MARCH

1-4: OIC Health Ministers meeting in Tehran highlights concerns in Africa and Asia and calls for significant political engagement to improve quality of vaccination campaigns and necessary funding from donor nations.

MAY



18-27: Sixty-second World Health Assembly meets in Geneva, with members showing deep concern over continued transmission in endemic countries - particularly in Nigeria - and the resultant international spread across west Africa and the Horn of Africa.

21-31: 222,270,331 children immunized against polio in 10 days in 22 countries, including 74 million children in 11 west African countries in a synchronized outbreak response, 70 million in northern India, 29 million in Pakistan and 49 million in Ethiopia, Kenya, Somalia, Sudan, DR Congo, Eritrea, Djibouti, Yemen and Nepal.

- Pakistan's polio programme mobilizes to prepare for more than 600,000 people fleeing military conflict in Swat.
- Memorandum of Understanding signed with Basic Package of Health Services NGOs to assist in delivery of SIAs. Close engagement continues with ICRC in Afghanistan to secure access to children in areas of conflict.



JUNE



US President Barack Obama and OIC Secretary General Ekmeleddin Ihsanoglu.

4: US President Barack Obama announces partnership with the Organization of the Islamic Conference (OIC) to accelerate eradication.

8-12: UNICEF Executive Board meeting holds special session on polio eradication, with special focus on enhancing social mobilization in Nigeria.

10-11: Results of bivalent oral polio vaccine presented to Advisory Committee on Poliomyelitis Eradication (ACPE), which recommends its production and use.

21-24: Rotary International Convention in Birmingham: Rotary announces it has raised \$90.7 million towards its \$200 million challenge grant. UN Secretary-General Ban Ki-moon is presented the prestigious Polio Eradication Champion Award by Rotary International President DK Lee and Rotary Foundation Trustee Chairman Jonathan Majiyagbe, which he dedicated to polio workers killed in 2008 in Afghanistan.



25: India Expert Advisory Group recommends full implementation of Intensified Kosi River Plan, ensuring full staffing by all partners in this area and setting up satellite offices and overnight stay points. Recommends continued implementation of migrant strategies, involving the detailed mapping and micro-planning of migrant communities in Uttar Pradesh, Bihar, Punjab, Gujarat, Delhi, greater Mumbai and West Bengal to ensure they are fully immunized each time a SNID is conducted.

JULY

8-10: At the L'Aquila Summit, G8 leaders commit to work towards completing the task of polio eradication.

30: Pakistan President Asif Ali Zardari receives a Polio Champion award from Rotary International Chair Dr Bob Scott for his ongoing support of the polio eradication programme.

AUGUST



Independent Evaluation conducts field visits.

8: Short-Interval Additional Dose strategy - where two doses of vaccine are delivered two weeks apart to rapidly raise immunity - is used to tackle a wild poliovirus type 1 outbreak in Turkana, Kenya, with immediate success. No cases have been reported from Kenya since 30 July, 2009.

SEPTEMBER

Systematic, real-time Independent Monitoring introduced across the sub-Saharan *wild poliovirus importation belt*.

10: Expert Review Committee for Polio Eradication in Nigeria commends progress to reducing missed children in vaccination campaigns in the highest-risk states after percentage of unvaccinated children in campaigns falls from 30% in January to 10% by the end of the year.

OCTOBER

- 1:** Launch of the *State of the World's Vaccines* report.
- 20:** Release of the Independent Evaluation (endorsed by the WHO Executive Board in January 2010).

NOVEMBER

18-29: The Advisory Committee on Poliomyelitis Eradication (ACPE) holds special consultation to launch development of a new multi-year Strategic Plan, district-specific plans, and an expanded environmental surveillance network.

DECEMBER

- 2:** NY Philharmonic Concert, featuring Itzhak Perlman, to 'End Polio Now'.



- 2:** US-OIC launch polio partnership.
- 16:** Afghanistan becomes the first country in the world to use bivalent oral polio vaccine in an immunization campaign.

5. Sustained implementation of core eradication strategies and assessment of new strategic approaches

Wild poliovirus (WPV) transmission was detected in 23 countries¹ in 2009. Of these, endemic transmission of types 1 and 3 continued in four: Afghanistan, India, Nigeria and Pakistan. The other 19 countries were affected by outbreaks of imported poliovirus.

In four of the 19 countries, poliovirus imported in previous years was considered to have re-established transmission (Angola, Chad) or was suspected of having done so (the Democratic Republic of the Congo and Sudan).

In 15 of the 19 countries, there were active outbreaks following importation of poliovirus²: Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic (CAR), Côte d'Ivoire, Guinea, Kenya, Liberia, Mali, Mauritania, Niger, Sierra Leone, Togo and Uganda. By the end of the first quarter of 2010, 10 of these 15 countries had stopped transmission³.

Circulating vaccine-derived poliovirus (cVDPV) was detected in five countries: type 2 in the Democratic Republic of the Congo, India, Nigeria and Somalia and type 3 in Ethiopia.

Analysis of the nucleotide (nt) sequence of the VP1 region of the viral genome continues to be used to investigate genetic and transmission links among isolates. In 2009, four genotypes of viruses were detected: West Africa B (WEAF-B) wild poliovirus type 1, WEAF-B type 3, South Asia (SOAS) type 1 and SOAS type 3.

WEAF-B type 1 and type 3 genotypes in Africa

The WEAF-B type 1 genotype is endemic to Nigeria and has been exported to numerous countries. Viruses

of this family accounted for approximately 60% of all reported type 1 cases in 2009, in 14 countries. Within Nigeria itself, there was a 90% decline in cases of WEAF-B type 1, from 721 in 2008 to 74 in 2009. For Benin, Burkina Faso, Côte d'Ivoire, Mali, and Togo, transmission was linked to virus imported in 2008. In Sudan, transmission represented continuation of an outbreak that appeared to be continuing since 2004. Kenya and Uganda had new importations from Sudan. Guinea, Liberia, Mauritania and Sierra Leone cases were linked to imported virus found in Côte d'Ivoire in 2008. Côte d'Ivoire viruses in turn were linked to Nigeria via Ghana and Togo, and to imported Nigeria viruses found in Benin and Burkina Faso in 2008. Niger had a single new imported type 1 virus from Nigeria in 2009.

The WEAF-B type 3 genotype is endemic to Nigeria, and was found in Nigeria, Cameroon, CAR, Chad and Niger in 2009. This genotype accounted for approximately 25 % of all cases reported globally and 40% of all type 3 cases. WEAF-B type 3 viruses in Cameroon represented separate new importations from Chad and Nigeria. Viruses in CAR represented importation from Chad. Viruses in Niger represented several (at least 10) separate importation events, one linked to Chad and all others to Nigeria. Within Nigeria the number of WEAF-B type 3 cases increased from 76 in 2008 to 313 in 2009.

SOAS type 1 and type 3 genotypes linked to India

SOAS type 1 and SOAS type 3 genotypes are endemic to India. Cases in India accounted for 17% and approximately 60%, respectively, of all type 1 and 3 cases reported globally in 2009. The majority of Indian SOAS type 1 viruses were found in the states of Uttar Pradesh (UP – 41%) and Bihar (48%). Sporadic SOAS type 1 cases found in Delhi and Rajasthan were linked to transmission in UP, whereas those found in Jharkand and Punjab were linked to viruses in Bihar. Together they accounted for 8% of SOAS type 1 cases.

There was intensive transmission of SOAS type 3 in India, with UP and Bihar accounting for 85% and 12%, respectively, of all reported cases from the country. Prior

¹ Afghanistan, Angola, Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic, Chad, Côte d'Ivoire, the Democratic Republic of the Congo, Guinea, India, Kenya, Liberia, Mali, Mauritania, Niger, Nigeria, Pakistan, Sierra Leone, Sudan, Togo and Uganda.

² In six of these 15 countries (Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger and Togo) virus importation occurred in 2008 (and in the latter five, again in 2009). In the remaining nine of the 15 countries, importations occurred in 2009 only.

³ See section *Wild poliovirus importation belt*.

to 2009 there were only two genetic clusters of SOAS type 3 found in India. Representatives of only one of these clusters were found in 2009. Sporadic type 3 cases detected in Delhi, Haryana, Himachal Pradesh, Punjab, Rajasthan and Uttaranchal were linked to transmission in UP.

SOAS type 1 viruses of Indian origin were found in Angola and Burundi in 2009. Cases in Angola represented continuation of local transmission of virus imported in previous years. The first of two cases in Burundi was distantly linked to a virus found in the Democratic Republic of the Congo in 2008, which in turn was part of an outbreak that followed importation of virus in 2007. No type 1 virus was found within the Democratic Republic of the Congo itself in 2009.

Country classification	Total 2009	
	W1	W3
Endemic		
Pakistan*	61	28
Nigeria	75	313
India*	80	661
Afghanistan*	16	22
Total	232	1024
Re-established transmission		
Chad		64
Angola	29	
Sudan	45	
Total	74	64
Outbreak		
Dem Rep of the Congo		3
Mali	2	
Mauritania	13	
Niger	1	14
Liberia	11	
Sierra Leone	11	
Guinea	42	
Burkina Faso	15	
Cameroon		3
Burundi	2	
CAR		14
Côte d'Ivoire	26	
Kenya	19	
Uganda	8	
Benin	20	
Togo	6	
Total	176	34
Global total	482	1122

* Includes W1W3 mixture (3 in total).

Wild poliovirus type 1 cases*

	2008	2009
Nigeria	722	75
India	75	80
Pakistan	81	61
Afghanistan	25	16
Re-established countries	35	74
Re-infected countries	38	176

* Includes one type 1/type 3 case in each of Nigeria and Benin in 2008 and each of India, Pakistan and Afghanistan in 2009.

Wild poliovirus type 3 cases

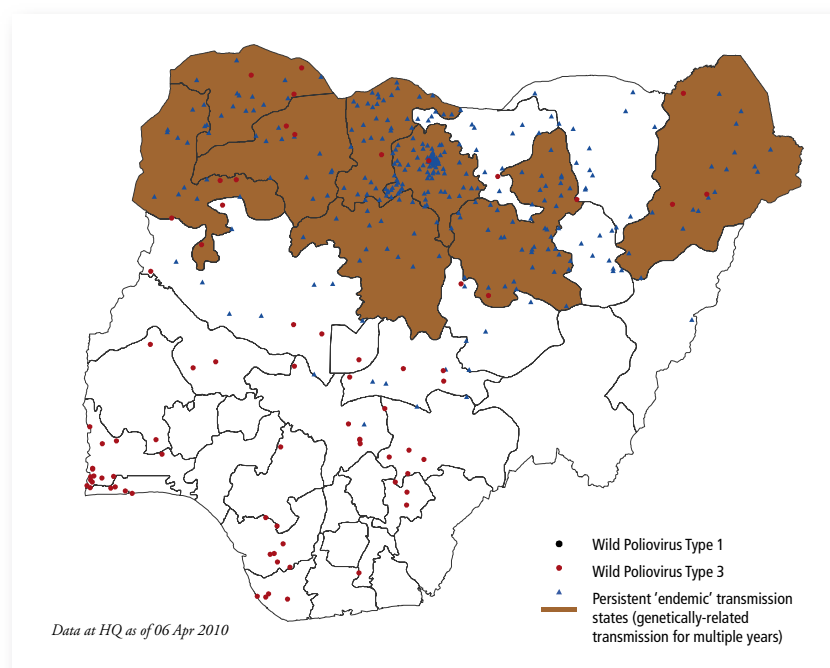
	2008	2009
Nigeria	76	313
India	484	661
Pakistan	36	28
Afghanistan	6	22
Re-established countries	62	67
Re-infected countries	11	31

i. Endemic countries

Nigeria

Nigeria began 2009 with intense transmission of both type 1 and 3 wild poliovirus, both of which fell over the course of the year. The outbreak of type 2 circulating vaccine-derived poliovirus peaked in April 2009, falling rapidly in subsequent months⁴. Critically, the proportion of children who had never been vaccinated declined in the 10 highest risk-states fell by nearly a third, from 9% to 6.5% over the year.

FACT BOX 2009



388 cases: 75 type 1, 313 type 3
3 National Immunization Days
5 Sub-national Immunization Days
198 infected districts out of 774

Major barriers

In its polio-endemic north, Nigeria has faced a range of chronic challenges in implementing the core eradication strategies, including inadequate micro-planning, supervision and community mobilization. The independent evaluation team for Nigeria found that management issues at local government level were the most critical barriers to improving Supplementary Immunization Activity (SIA) implementation and reaching all children with OPV. The team recommended building on the improvements in vaccination campaign coverage made in 2009, in particular by establishing specific mechanisms to hold leaders of local government areas accountable for programme performance.

⁴ See section *Global Polio Laboratory Network*.

Assessment of new strategic approaches

In February 2009, Nigeria's 37 State Governors signed the 'Abuja Commitments to Polio Eradication', pledging to be actively engaged in the planning and implementation of immunization activities, and to encourage traditional and religious leaders to increase community awareness and acceptance of polio immunization drives. The event was held during a visit to Nigeria by the co-chair of the Bill and Melinda Gates Foundation, Bill Gates, Jr. Critically, the Federal and State governments, the Governors and all tiers of the revered traditional and religious leadership have backed up these words with firm action, effectively taking ownership of the polio programme, building community demand by directing parents to immunize "every child, every time". These directives have helped to close vaccination gaps, driving immunization levels towards 80%, resulting in a fall in cases during the last six months of 2009. Type 1 cases fell by more than 95% throughout 2009 and Kano state – one of the epicentres of type 1 polio – recorded only type 1 case, in January 2009. Poliovirus is restricted to 85 high-risk Local Government Areas (LGAs, or districts) in the north.

In mid-2009, the strong support of Nigeria's traditional leadership was institutionalized when His Eminence the Sultan of Sokoto established the 'National Task Team

of Northern Traditional Leaders', which meets regularly to coordinate and plan their support and engagement for SIAs. In each immunization activity since the 'Abuja Commitments' were signed, the Sultan or at least one Emir has launched SIAs in their states, garnering wide media coverage, while several Emirs have conducted radio announcements prior to each activity. This highly visible support has filtered down to the ground, with district, village and ward heads actively committing to ensure the maximum number of children in their areas of responsibility are immunized during campaigns.

At the same time, new mechanisms have been established to track the engagement of LGA Chairpersons. With this renewed leadership, operational gaps are being filled: vaccinator selection is more appropriate (with larger numbers of older women – who command more respect in the community – being employed), and training and supervision is more targeted, while improved micro-planning provides vaccinators with a clearer logistical guide for the day's work, armed with an adequate supply of correctly chilled vaccine. Social mobilization activities are being scaled up, and communities are more fully engaged in all aspects of SIAs. Where once immunization teams would slink from door to door, trying to remain unnoticed, now they march down the main streets of Kano, the Emir's trumpeter walking behind, wailing a tune inviting children to come to be immunized. Beside him, a social mobilizer calls through a megaphone for parents to bring their children to be immunized.



HRH the Emir of Kano immunizes his grandson at the launch of the November 2009 Immunization Plus Days.

By the end of 2009, the proportion of zero-dose children in the 12 highest-risk states had dropped below 5% for the first time ever. In Kano, this figure fell from 29% in January 2009 to 19% in December 2009.

As the proportion of children being immunized has risen, the number of cases has plummeted. In the first six months of the year, 357 cases were reported; in the following six months, 21 cases. In the first quarter of 2010, Nigeria recorded two cases.

Throughout 2009, surveillance system quality and consistency continued to improve, with the proportion of LGAs meeting both surveillance indicators⁵ rising from 78% in 2008 to 86% by the end of 2009. An active policy of peer surveillance reviews at state level has resulted in greater consistency of surveillance across LGAs. These improvements underline the fact that the observed decline in the incidence of poliovirus is real.

Independent monitoring data has likewise shown a steady improvement in the consistency of immunization coverage during SIAs, with the proportion of wards with >10% missed children declining in all endemic states between January 2009 and January 2010. The proportion of LGAs in the four highest-risk states achieving at least 90% immunization coverage has improved from 53% (in January 2009) to 84% (in November 2009). Likewise, the percentage of children being recorded as fully immunized with more than three doses of OPV by non-polio AFP data rose from 57% to 65% during 2009.



A woman smiles moments after her child was immunized with OPV in Kano, northern Nigeria, in November. Kano, once the global epicentre of type 1 polio, has not seen a case for more than 12 months.

5 Non-polio acute flaccid paralysis rate >2 and adequate specimen collection rate >80%

Looking ahead

The *Independent Evaluation* and the Expert Review Committee for Polio Eradication in Nigeria concluded that while it is evident that much of the country is now polio-free, the greatest risk of continued transmission is the failure of very high-risk LGAs to fully address gaps in immunization coverage during SIAs, particularly in urban areas of Kano State. A very weak routine immunization programme also means the GPEI is dependent on the quality of its own activities.

Like all of the Nigerian polio eradication programme, caution against overconfidence must be urged, with a Lot Quality Assessment Sampling (LQAS) activity conducted in five northern states in November 2009 demonstrating that considerable gaps still existed in immunization coverage and in the accuracy of the reporting of that coverage. The challenge for Nigeria throughout 2010 is to guard against complacency and to refocus efforts on closing coverage gaps to ensure immunization campaigns reach every last child.

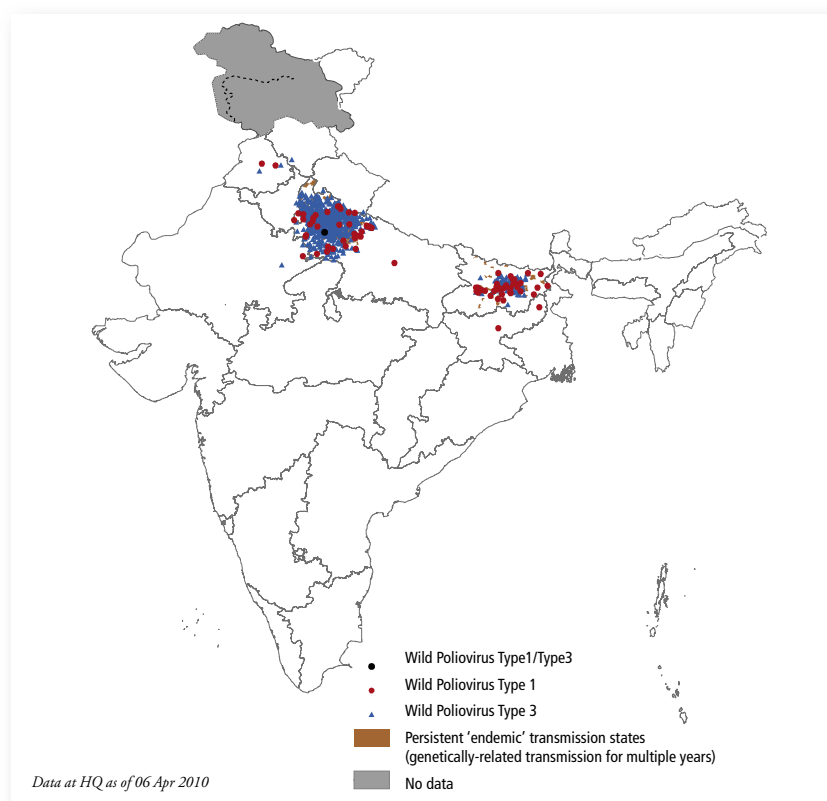
Evaluation summary

In Nigeria, the Evaluation Team recognized the improvements in the coverage achieved in SIAs since state Governors issued the 'Abuja Commitments' in February 2009, with the proportion of 'zero-dose' children and cases now declining. The Evaluation Team expressed concern, however, that state-level implementation of the 'Abuja Commitments' remains variable and recommended a process be developed to ensure its close monitoring from the federal level. The Evaluation Team stressed the need to rapidly establish specific mechanisms to hold leaders of LGAs accountable for programme performance, stating that "the 'war' against polio in Nigeria will be won or lost at the local government level" where management issues were the most critical barriers to success. Noting the limited ability of vaccination team to respond to the most basic of community challenges, the Evaluation Team highlighted the need to ensuring the appropriate selection and training of vaccination teams and full implementation of social mobilization strategies.

India

India continues to have a very high-performing eradication programme, consistently reaching upwards of 95% of its target population with OPV during polio vaccination campaigns. However, type 1 and 3 wild poliovirus transmission persists in the two remaining endemic states, located side-by-side in India's north, Uttar Pradesh (UP) and Bihar, where the primary challenge is reaching the children of migrant communities and those living in the remote Kosi River flood plain.

FACT BOX 2009



741 cases: 79 type 1, 661 type 3 and one type 1-type 3 co-infection

1 National Immunization Day

9 Sub-national Immunization Days/Mop-ups

56 infected districts out of 626

Major barriers

Transmission has been sustained by two high-risk population groups - the children of marginalized populations in Bihar's hard-to-reach Kosi River area and the large numbers of highly mobile migrant workers in both Bihar and western UP (at any given moment, five million people – a population the size of Switzerland – are on the move across northern India). Analysis of type 1 cases from 2007-09 shows that 42% of the type 1 cases occurring outside of UP and Bihar involved migrants from these two states. Data from non-polio AFP cases confirm that migrants are under-vaccinated compared to the general population

(21% versus 13% received seven or fewer doses, respectively). These difficult-to-access groups, coupled with the high force of poliovirus infection due to demographic and environmental conditions, facilitates ongoing transmission in these states.

The programmatic focus on tackling the most dangerous type 1 polio with sustained mOPV1 campaigns has reduced the number of remaining genetic chains of type 1 transmission from nine in 2006 to just one in 2009. Large-scale SIAs delivered on average every four to six weeks in the high-risk areas targeted this final chain throughout 2009.

However, focus on type 1 wild poliovirus came at a cost – reduced immunity to type 3 – resulting in a large type 3 outbreak in UP during the 2009 “high season” and a smaller one in Bihar.

Assessment of new strategic approaches

Through 2009, the GPEI put into action specific plans to reach children in the Kosi River basin and in migrant communities. The former saw staff re-deployed from polio-free states to support the planning, implementation and monitoring of immunization activities along the flood plain; and 59 satellite offices and hundreds of overnight stay huts built in the hardest-to-reach areas of the Kosi River embankment, allowing Surveillance Medical Officers to be based on the flood

plain during SIAs to ensure the highest possible quality immunization activities. Complementary to the Kosi River plan is an “Underserved Communication Strategy” that targets ‘hard-to-reach’ and high-risk groups such as migrant, mobile and nomadic populations.

As part of an ongoing, aggressive programme of research, a number of clinical trials were conducted in India in 2009. A clinical trial evaluated the new bOPV, containing both type 1 and 3 serotypes, and found it to be clearly superior to trivalent OPV (tOPV, containing types 1, 2, and 3 serotypes), and almost as good as the respective monovalent OPVs (mOPV1 and mOPV3).

Recognizing the need to explore all possible approaches to boosting population immunity in infected areas, a second clinical trial was conducted in Moradabad, western UP. The trial evaluated five arms: a standard-potency mOPV1; a high-potency mOPV1; two inactivated polio vaccines (IPV) from separate manufacturers administered whole-dose (intramuscularly); and, an IPV at a fractional dose (1/5th) given intra-dermally by needle-free device. The salient finding from this research is that the comprehensive delivery of mOPV1 had conferred high levels of population immunity: with 99% of children in the study having seroconverted to type 1, up from 81% in late 2007. Initial results from the trial also suggest the intradermal IPV did not perform as well as the whole-dose intramuscular IPV in this setting, and further trials will be implemented to ascertain a potential role of intradermal IPV.



Health workers go to extraordinary lengths to vaccinate children along the Kosi River Basin.



A man brings his child to be immunized by a vaccination team in the crowded alleyways of a town in western Uttar Pradesh.

In June 2009, the India Expert Advisory Group (IEAG) concluded that India's eradication effort was 'on track' to achieve success, especially given the imminent introduction of bOPV, and the fact that genetic biodiversity of the wild poliovirus was at an all-time low.

The introduction of bOPV in India contributed to ending the type 3 outbreak in the latter half of the year and finally enables the programme to raise immunity to type 3 while maintaining pressure on eradicating type 1. As a result, during the low poliovirus transmission season of early 2010, India was for the first time in a position to complete type 1 polio eradication and set the stage for type 3 eradication. By the end of the first quarter of 2010, UP and Bihar had not reported a type 1 case since 13 November and 29 October, 2009, respectively – the longest period in history where both states have not recorded any type 1 cases concurrently.

Looking ahead

Geographic analysis of type 1 cases over the past six years shows that more than 80% of cases have been reported from only 107 administrative "blocks" or sub-districts (66 in UP and 41 in Bihar), representing just 2% of the administrative areas of the country, and that these blocks were key to eradication in the country. By early 2010, this sharpening of focus became the '107-Block Plan'.

The '107-Block Plan' features aggressive new approaches, focusing on three key areas: 1) reducing the known risk-factors of polio infections, to lessen the force and ease with which polio can transmit in this setting; 2) improving OPV 'take'; and, 3) filling any residual known vaccination coverage gaps, particularly on the flood plains of Bihar and among mobile populations.

As a result, in addition to sustained campaigns with bOPV, simple sanitation measures are being implemented (such as protecting water pumps from faecal contamination), social mobilization strategies have been developed to promote personal hygiene behaviour change (e.g. the importance of hand washing), and zinc supplements (associated with a reduction in diarrhoeal disease) are being distributed. 'Hard-to-reach' groups are being identified and mapped, not only in UP and Bihar but also in destination sites; environmental surveillance is being introduced in Delhi to help monitor virus circulation (successfully applied in Mumbai); and the potential role of additional vaccine solutions (such as inactivated poliovirus vaccine) is being investigated.

While more research will be conducted in 2010 to more clearly understand mucosal immunity in the UP setting, all evidence suggests that remaining immunity gaps are primarily to type 3 polio, in young children among mobile populations. The introduction of bOPV and implementation of key approaches to identify and reach mobile populations in UP, Bihar and the destination states – including the mapping of sites where mobile populations congregate – the inclusion of these sites in new microplans, and subsequent monitoring of sites to ensure they are being covered during SIAs – are key to closing these gaps.

Evaluation summary

In India, the Evaluation Team independently verified high vaccination coverage in both of the remaining endemic areas, (i.e. central Bihar and western Uttar Pradesh). This reinforced the need for an aggressive research agenda which includes studies of mucosal immunity following oral polio vaccine and inactivated polio vaccine, mathematical modelling, seroprevalence studies and an evaluation of the effect of poor nutrition and chronic diarrhoea on immunity to polio. The Evaluation Team recommended a multipronged approach to India's uniquely efficient transmission and suboptimal oral polio vaccine efficacy, including an ongoing review of supplementary immunization activity strategy as new research data became available (e.g. on vaccine type, campaign frequency, target age groups); targeted use of inactivated polio vaccine; improving routine immunization; zinc supplementation; and simple sanitation measures (e.g. protecting hand pumps from faecal contamination).

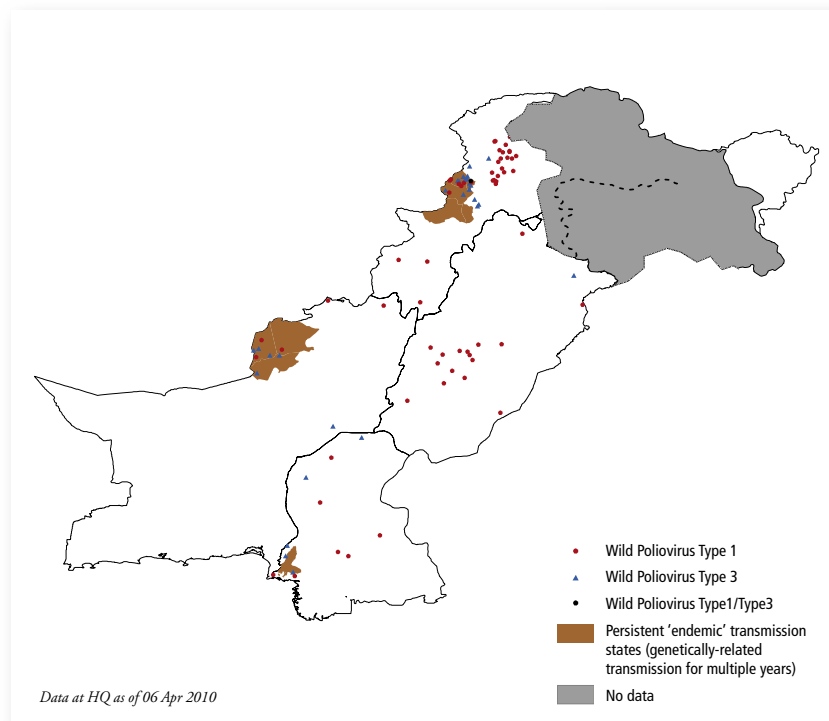
Pakistan

Pakistan is the only country globally to have reduced both types of polio in 2009 by more than 20%. Nonetheless, both type 1 and 3 transmission continued in persistent-transmission areas from where polio virus regularly spreads and causes national outbreaks: 10 districts (out of 152 countrywide) located in greater Karachi, Sindh; greater Quetta, Balochistan; and North West Frontier Province (NWFP)/ Federally Administered Tribal Areas (FATA). Compounded by insecurity in the latter particularly, and following improvements in other endemic countries, Pakistan is moving into the position of the leading polio-endemic country.



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FACT BOX 2009



**89 cases: 60 type 1, 28 type 3
and one type 1-type 3 co-infection**

6 National Immunization Days

**9 Sub-national Immunization
Days/Mop-ups**

34 infected districts out of 135

Major barriers

Accountability for the quality of polio eradication operations was a major barrier identified by the *Independent Evaluation* in Pakistan, precisely in the areas with persistent transmission, such as Karachi, Quetta and the NWFP/FATA. These districts were either densely populated but accessible, or sparsely populated but security-compromised; but in both cases, persistent transmission was plainly aligned with vaccination coverage gaps. This demonstrated that the traditional National Immunization Day (NID) approach was too broad to address chronic operational problems and underlined the need for a district-specific approach.

Polio eradication efforts in Pakistan in 2009 were seriously affected by two large-scale military campaigns in the security-compromised, polio-infected areas of

Swat and South Waziristan (NWFP/FATA). While these offensives resulted in the short-term mass-movement of populations from infected areas, spreading poliovirus from regions the GPEI had been unable to access, they also opened up areas, like Swat, that had been inaccessible for long periods. There were notable improvements in the fourth quarter of 2009 in the GPEI's ability to access settled districts of NWFP, and in Swat, 99% of children were accessible in the December 2009 NIDs – a figure unimaginable for most of 2008-09. However, these improvements are not uniform, with deterioration in access to some key tribal agencies of FATA, especially Khyber and Bajour.

Assessment of new strategic approaches

In 2009, the GPEI was finally able to monitor SIA performance more accurately through a combination of finger marking and independent monitoring. The expansion in mid-2009 of sewage sampling to Karachi and Lahore has enhanced surveillance levels and allows the programme to identify and target remaining reservoirs of poliovirus. The Federal Government now has the necessary data to accurately identify and hold poor-performing accessible areas accountable.

To institutionalize this engagement, Prime Minister Yusuf Gillani launched the "Prime Minister's Action Plan for Polio" in February 2009. This followed the establishment of an Interprovincial Committee for Polio, chaired by the Federal Minister of Health and bringing together all provincial health ministers, to manage inter-sectoral coordination and track the engagement of officials at district and union council level.

Enhanced political engagement and accountability was emphasized in October, as President Asif Ali Zardari, inaugurating NIDs, called on the country's provincial and district leadership to ensure that all children are reached during campaigns and announced the appointment of his daughter as Ambassador to Pakistan's polio eradication efforts.

Innovations in Pakistan in 2009 included inter-sectoral cooperation with the National Highways and Motorways Police, the Lahore Police, and National Database and Registration Authority, all of which mobilized their staff, provided teams to immunize children or assisted in monitoring. Pakistan's largest mobile phone operator, Mobilink, joined the effort, sending out millions of short text messages notifying parents of NIDs.

Looking ahead

To improve population immunity levels in security-compromised areas, more children must be reached, and the impact of each vaccination maximized when contact is made. Local access negotiators are now actively engaged ahead of SIAs, working on the ground with health cluster NGOs and significantly scaling up social mobilization activities. A district-specific approach was rolled out in late 2009, with cross-cutting strategies to more effectively engage and immunize the Pashtun-speaking community, given the evidence that the under-immunization of this community was contributing to inter-provincial spread (representing 18% of the population, Pashtun speakers suffered 80% of cases in 2009, and their travel to and from Afghanistan results in cross-border transmission of poliovirus). Bivalent OPV is a valuable new tool, offering protection against both serotypes with one contact and maximizing the impact of each SIA, and the 'Short-Interval Additional Dose' strategy is increasingly employed whenever possible, conducting additional localized immunization activities when safe.

At best, these steps have helped Pakistan reach a stalemate with poliovirus by the end of the year. Tracking of local authorities' accountability, continued area-specific planning, sensitive access negotiations and tailored social mobilization are critical to Pakistan joining the progress of other endemic countries.

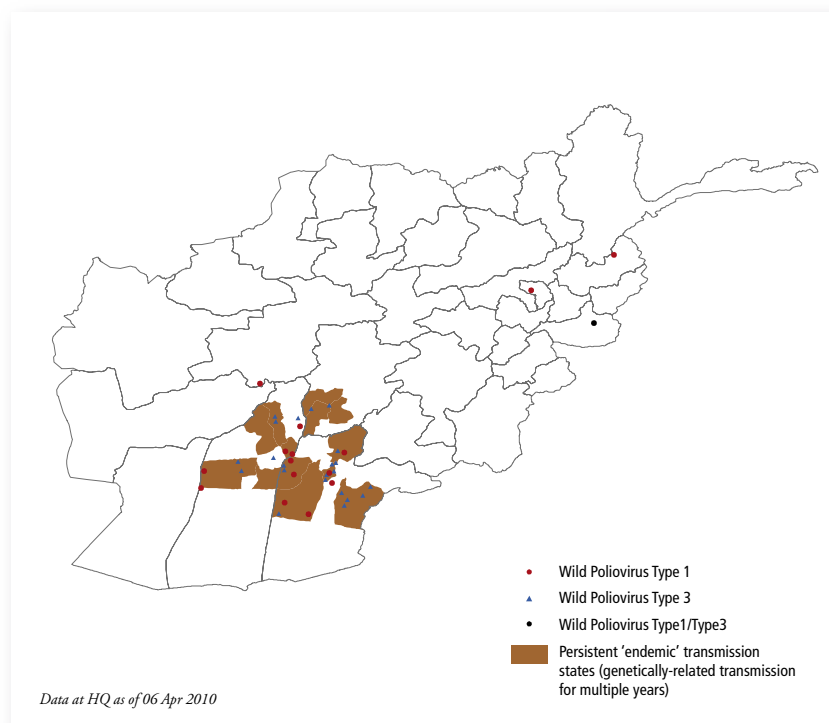
Evaluation summary

In Pakistan, the Evaluation Team found that "political interference in appointing vaccinators and their accountability are major problems in some areas", especially in greater Karachi, Sindh and the Quetta area of Baluchistan, and recommended monitoring campaign coverage at the sub-district (union council) level to hold district leaders accountable for eradication resources & performance. The Evaluation Team recommended that strategies be adapted as necessary to ensure that resources for SIAs be more effectively targeted at the 'reservoir' districts. To improve coverage in security-compromised polio-infected districts, the Evaluation Team recommended that the scope of sub-national polio campaigns be focused on these districts and that district-specific plans and solutions be developed and implemented based on the local culture, local partners (especially NGOs), and nature of the conflict.

Afghanistan

Most of Afghanistan is polio-free: 28 of the 31 children paralysed by polio in 2009 came from 13 conflict-affected districts (of 329 districts countrywide) in Helmand, Kandahar and Uruzgan provinces of the Southern Region, which together have just over 670,000 children under the age of five years. Despite the extreme security situation, the many innovations introduced in 2009 contributed to a decrease in the overall proportion of missed children to 5% in the Southern Region.

FACT BOX 2009



A child receives bivalent oral polio vaccine in Jalalabad, eastern Afghanistan.

38 cases: 15 type 1, 22 type 3 and one type 1-type 3 co-infection

6 National Immunization Days

5 Sub-national Immunization Days/Child Health Days

16 infected districts out of 329

Major barriers

Active conflict remains one of the key barriers to Afghanistan's polio eradication efforts. In some campaigns earlier in 2009 the proportion of "missed" children in the 13 persistent transmission districts during vaccination campaigns reached as high as 60%. While poliovirus remains limited to areas where access to children is difficult or dangerous, operational challenges during SIAs – such as insufficient supervision or vaccinator training – also played a role in some areas.

Assessment of new strategic approaches

Polio eradication efforts in 2009 focused on both improving SIA operations and creating a safe environment for vaccination teams. A range of new strategies were piloted or expanded in Afghanistan's Southern Region. Due to operational improvements – such as strengthened supervision and staffing of immunization teams – and more sophisticated access negotiations, the proportion of children in the southern region who could *not* be reached was reduced from over 20% in early 2009 to 5% during the July and September 2009 campaigns.

The year's work included more systematic engagement with all sides to the conflict, including with the ISAF (International Security Assistance Force), Afghanistan forces and anti-government elements, the latter with the critical assistance of the International Committee of the Red Cross (ICRC). The engagement of local community and traditional leaders, and systematic collaboration with local NGOs contracted by the Government of Afghanistan to deliver basic packages of health services (BPHS) also resulted in improved access to families.

The availability of bOPV multiplies the effect of such improvements – on 15 December 2009, Afghanistan became the first country globally to use the game-changing vaccine when it delivered bOPV to 2.8 million children in the Southern, South-Eastern and Eastern Regions.

The Short Interval Additional Dose (SIAD) approach was implemented where possible – often due to the work of local access negotiators – maximizing windows of accessibility in Kandahar and Helmand. This led to the decline in unreached children over the year, despite a general deterioration in security throughout the country and especially in the Southern Region. The September 2009 Sub-national Immunization Days (SNIDs) were one of the most successful campaigns on record, reaching up to 880,000 children across 19 high-risk districts of Kandahar, Helmand and Uruzgan, with less than 4% of children termed “inaccessible”.

Population immunity in these sparsely populated districts appears to be hovering close to the tipping point to eradication, given that transmission of one, then the other, poliovirus continues to be interrupted; in 2009 – not for the first time – type1 poliovirus transmission was stopped before re-introduction early in 2010 from Pakistan. The cycle continues with



A vaccination team in rural Afghanistan.

regular re-introduction and circulation between the two countries. Ramping up the number of border vaccination posts is important to help decrease the intensity of cross-border transmission of poliovirus.

Looking ahead

Within the 13 persistent-transmission districts, population immunity remains inadequate, with up to 5% of children having never received any polio vaccine. The need now is to consolidate the new operational and advocacy approaches in specific plans in these districts, and to improve the quality of immunization teams, namely by increasing the volume of training to vaccinators and supervisors and ensuring vaccinators are old enough to warrant the trust of the community. 2010 has therefore seen the development of district-specific plans for these 13 districts, in an attempt to ensure access in these areas. Capacity will also be scaled up, both by increasing the number of technical staff to these areas, and by offering current staff better tools (i.e. better training materials, better focus on supervisor selection and vaccinator training, and more detailed micro-plans).

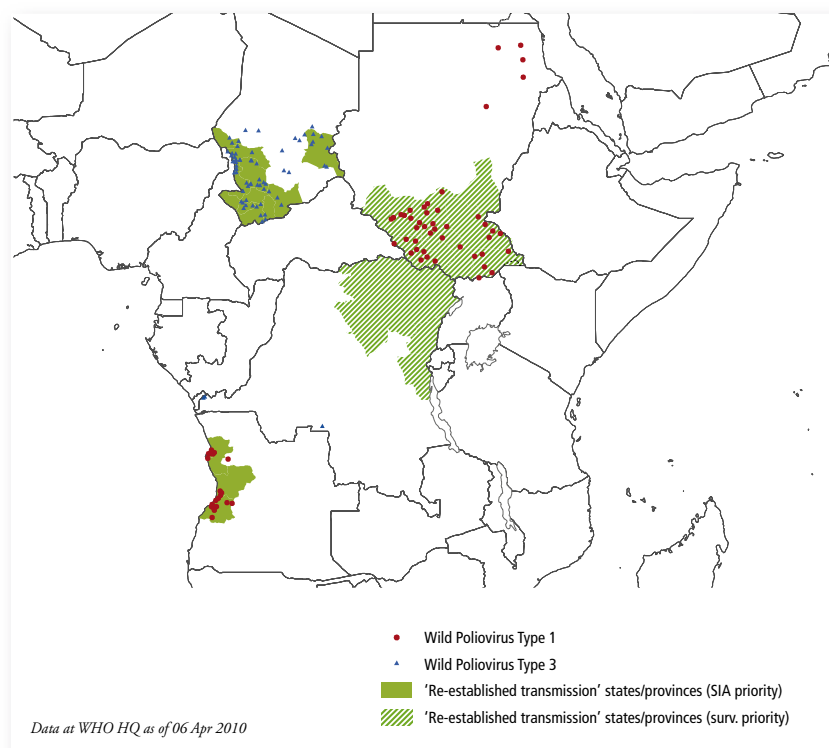
Evaluation summary

The Evaluation Team recommended that strategies in Afghanistan be adapted as necessary to ensure that resources for SIAs be more effectively targeted at the ‘reservoir’ districts. To improve coverage in the security-compromised, polio-infected districts, the Evaluation Team recommended that the scope of sub-national polio campaigns be focused on these districts and that district-specific plans and solutions be developed and implemented based on the local culture, local partners (especially NGOs), and nature of the conflict. The Evaluation Team stressed the need to maintain the neutrality of the polio eradication effort by not linking it too closely to political leaders or parties in such areas.

ii. Re-established transmission countries

One of the major problems facing the GPEI in 2009 was the sustained transmission of imported wild poliovirus for more than 12 months in Angola and Chad, and probably in the Democratic Republic of the Congo and Sudan. This extraordinary situation resulted in the Advisory Committee on Poliomyelitis Eradication (ACPE) recommending that these four countries now be considered to have either proven (Angola or Chad) or suspected re-established transmission of wild poliovirus.

FACT BOX 2009



A child receives oral polio vaccine during a National Immunization Day in Chad. Bredjing Refugee Camp, Ouaddai State, Eastern Chad. November 19-21, 2004.

Major Barriers

A failure to fully implement the international wild poliovirus outbreak response guidelines was the major barrier to polio eradication in the re-established transmission countries. These countries need to scale up technical assistance, re-train staff to maximize the impact of immunization campaigns, increase their emphasis on social mobilization and close surveillance gaps to tackle ongoing transmission.

Angola: 29 type 1 cases, 2 NIDS, 6 SNIDS/Child Health Days (CHDs), 10 infected districts out of 164

Chad: 66 type 3 cases, 2 NIDS, 4 SNIDS, 29 infected districts out of 61

Democratic Republic of the Congo: three type 3 cases, 0 NIDS, 9 SNIDS/CHDs/mop-ups, 2 infected districts out of 515

Sudan: 45 type 1 cases, 4 NIDS, 8 SNIDS, 24 infected districts out of 135

Implementation of eradication strategies

In 2009, the *Independent Evaluation* recommended that, given the very weak health systems that existed in the "re-established transmission" countries, these areas must be approached in a similar manner to endemic countries in terms of staffing support, time and investment, and pre-planned campaigns. By the end of 2009, the resultant scale-up of technical support and independent SIA monitoring had already helped to address the root problems and is guiding some improvements.

Chad and Angola have had proven active outbreaks of imported wild poliovirus for more than two years, and by the end of the first quarter of 2010, were continuing to report cases. In these countries, the focus is on significantly improving the quality of immunization coverage in SIAs/mop-ups to end transmission. The second priority is on improving AFP surveillance sensitivity to quickly locate cases and, eventually, declare with confidence that transmission has stopped. Political engagement at all levels is crucial, built on a deeper understanding of the threat these countries pose to polio eradication in Africa.

Due to the alarming persistence and amplification of imported wild poliovirus in Chad, and the very real possibility that it would re-infect its neighbours, WHO's Regional Director for the African Region visited Chad in May, 2009, to press upon national authorities the urgent need to improve polio immunization campaign quality. Joining the RD on this mission were the Chairperson of the Regional Certification Commission for Poliomyelitis Eradication (RCC) in Africa and the Chairperson of the African Region Interagency Coordinating Committee (ARICC) to discuss with the Chadian government the need to intensify all polio eradication activities. In a meeting with the Prime Minister and the new Minister of Health, the strategic importance of Chad to this international health effort was outlined.

In the second half of 2009, Chad recorded the highest number of cases in Africa (53). In early 2010, President Idriss Derby responded by personally declaring war on polio and calling a meeting of all provincial governors to ensure they were held accountable for the implementation of polio campaigns. Surveillance and case investigation suggests that transmission is being maintained in the heavily populated but fully accessible population centers of N'Djamena, Abeche and the southern cities. Consequently, the programme's highest priority has been to boost coverage in these areas (as even the capital city can still have >40% missed children during a polio vaccination campaign). During 2009, as many as 11 international consultants were recruited and deployed to Chad to assist with SIA planning, advocacy, implementation, monitoring and surveillance in these priority provinces. The opening of three sub-offices in 2009 also drove improvements in the collection of surveillance data.

In Angola, the recognition that wild poliovirus had become re-established in the country led to a concerted effort by the Government and partners to address immunization coverage gaps, particularly in

the densely populated and heavily travelled Luanda-Benguela corridor, which continued to record the bulk of polio cases. Some Governors actively promoted and implemented SIAs, the military assisted with SIA logistics and Independent Monitoring, while partners assisted with monitoring campaigns to identify coverage gaps for immediate re-immunization. However, even by late 2009 transmission persisted, at least in the Luanda area, with the serious risk of further spread.

Southern Sudan has not reported any cases of wild poliovirus type 1 since 27 June 2009, while the Democratic Republic of the Congo has not reported any cases since 5 August, 2008 (Democratic Republic of the Congo tackled a separate type 3 outbreak in 2009, and was re-infected with virus from northern Angola in the second quarter of 2010). Experts remain cautious of the eradication status of both countries, given their inadequate surveillance performance in 2009. (This was underlined in September 2009, when the detection of a wild poliovirus type 1 case in Burundi that was genetically linked to a virus last detected in Democratic Republic of the Congo in August 2008 pointed to the likely persistence of undetected type 1 poliovirus in the east of the country.)

Looking ahead

The GPEI resources, particularly international technical assistance (including for communications) will be substantially enhanced for these areas, to levels which are comparable to the GPEI investment in endemic areas. Long-term experienced polio consultants are being deployed to key areas to enhance immunization campaigns and tackle surveillance gaps. Operational guidelines and outbreak response microplans are being revised, with retraining of supervisors, vaccination teams and mobilizers. Any districts achieving <90% coverage during any SIA will be re-covered.

Evaluation summary

The Evaluation Team found that persistent polio outbreaks following importations (i.e. in Angola, Chad, Sudan) were due to a failure to implement fully the international guidelines on polio outbreak response, and recommended aligning the level of technical assistance in such areas with that in endemic areas, retraining existing staff, and increasing emphasis on social mobilization.

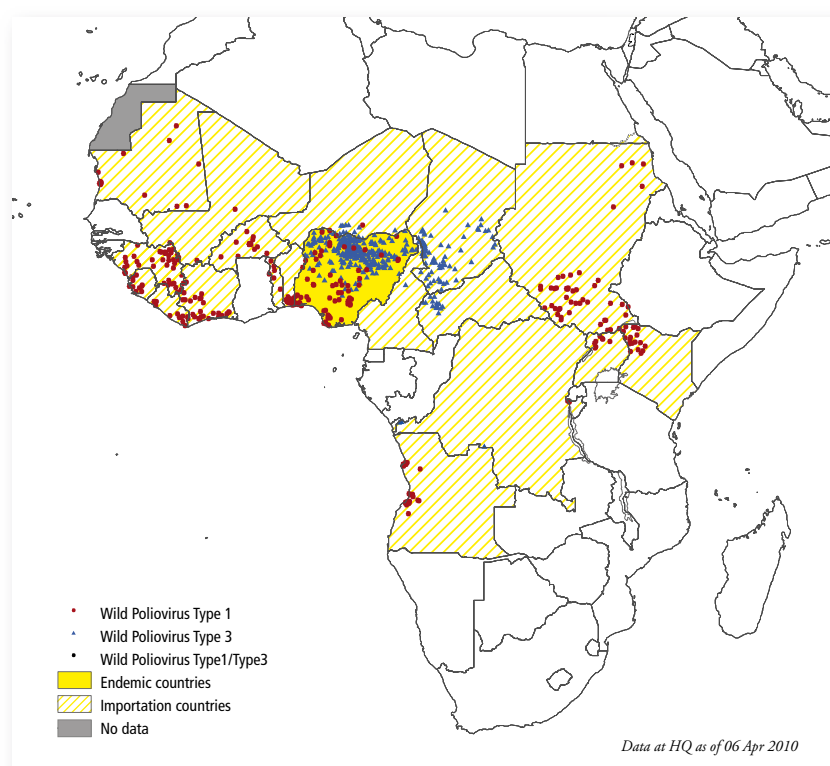
iii. Acute outbreak countries

In 2009, significant international spread of wild poliovirus occurred across West Africa, the Horn of Africa and central Africa. This sub-Saharan belt is clearly susceptible to re-importations from endemic areas, having been recurrently infected due to the mixture of low routine immunization coverage and the frequent movement of populations. By the end of 2008, an outbreak of wild poliovirus type 1 which originated in northern Nigeria had spread to infect seven countries: Niger, Togo, Benin, Burkina Faso, Ghana, Côte d'Ivoire and Mali. This outbreak spread further westwards in 2009, through Sierra Leone, Liberia, Mauritania and Guinea.

In the Horn of Africa, a type

1 outbreak from southern Sudan infected northern Sudan, Kenya and Uganda, while in central Africa, Burundi was infected, probably from undetected wild poliovirus transmission in the Democratic Republic of the Congo, and CAR and Cameroon were infected from type 3 wild poliovirus from Chad.

Wild poliovirus cases across the sub-Saharan importation belt 2009



West Africa

Benin: 20 type 1 cases, 4 NIDS, 1 SNID, 14 infected districts out of 77

Burkina Faso: 15 type 1 cases, 6 NIDS, 1 SNID, 11 infected districts out of 63

Côte d'Ivoire: 26 type 1 cases, 7 NIDS, 19 infected districts out of 72

Guinea: 42 type 1 cases, 5 NIDS, 19 infected districts out of 38

Liberia: 11 type 1 cases, 4 NIDS, 1 SNID, 6 infected districts out of 15

Mali: 2 type 1 cases, 3 NIDS, 3 SNIDS, 2 infected districts out of 59

Mauritania: 13 type 1 cases, 1 NID, 1 SNID, 12 infected districts out of 53

Niger: 15 cases, one type 1 and 14 type 3 cases, NIDS, 2 SNIDS, 10 infected districts out of 42

Sierra Leone: 11 type 1 cases, 5 NIDS, 5 infected districts out of 13

Togo: 6 type 1 cases, 4 NIDS, 5 infected districts out of 35

Horn of Africa

Kenya: 19 type 1 cases, 8 Mop-Ups/CHDs, 3 infected districts out of 78

Uganda: 8 type 1 cases, 1 NID, 5 SNIDS, 2 infected districts out of 80

Central Africa

Burundi: 2 type 1 cases, 2 NIDS, 1 infected district out of 41

Cameroon: 3 type 3 cases, 1 NID, 3 CHDs/Mop-ups, 2 infected districts out of 173

Central African Republic: 14 type 3 cases, 4 NIDS, 3 SNIDS/CHDs, 1 infected district out of 24



© Ricardo Gangiel/UNICEF

Four-year-old Aicha Traore was the first case of wild poliovirus in Côte d'Ivoire in four years.

Major Barriers

The major barrier to polio eradication across the *wild poliovirus importation belt* of sub-Saharan Africa has been inadequate routine immunization services, resulting in insufficient population immunity levels to prevent wild poliovirus outbreaks following new importations.

Implementation of eradication strategies

Several approaches were employed by the GPEI in its efforts to tackle these outbreaks, including:

- 1) Real-time Independent Monitoring using standardized modules of data was introduced across Africa, enabling the government's program to more rapidly identify poor-performing areas for immediate re-vaccination, and to guide corrective action in advance of the next SIA. Any district with <90% coverage during any SIA was immediately re-immunized. Going forward, international reviews of outbreak responses will also be conducted if any country has more than six months' continual transmission and all countries across the importation belt are expected to annually update outbreak response readiness plans.
- 2) The Short-Interval Additional Dose (SIAD) strategy, which immunizes children at short intervals to rapidly raise immunity to one serotype of wild poliovirus, was employed successfully in Kenya, serving to end the outbreak in that country (last case reported on 30 July, 2009).
- 3) Human Resources were significantly scaled up, particularly across the Horn of Africa, with 10 eSTOP consultants being deployed to southern Sudan for 12 months to improve AFP surveillance, and short-term consultants and strong headquarter staff support being deployed to Kenya and Uganda.
- 4) Pre-planned polio campaigns were synchronized to increase immunization coverage and raise immunity as a multi-country block to levels required to end the current outbreak and prevent new ones. Up to 53 million in eight countries were immunized over one weekend in February and June, 2009, and up to 85.5 million children in 19 countries were immunized in March and April, 2010.

- 5) Advocacy activities were strengthened to raise political awareness of the international importance of stopping the outbreaks; Rotary and leaders of other partner agencies actively engaged Ministers of Health of outbreak countries. Additionally, WHO's Africa Regional office and headquarters held one-on-one meetings with all Ministers of Health during the World Health Assembly and the Regional Committee Meeting to underline the importance of conducting high-quality SIAs to stop these outbreaks. The Organization of the Islamic Conference's health ministers meeting in March, 2009, highlighted the polio outbreaks in west and central Africa and urged member states to ensure every child was reached in SIAs. Finally, the President of the Government of southern Sudan, General Salva Kiir Mayardit, launched a "Presidential Action Plan for Polio Eradication," creating an inter-ministerial coordination committee to urgently address the polio outbreak in southern Sudan, placing full responsibility and accountability for improving the quality of outbreak response on state and county (district) governments.

The impact of the outbreak response activities across the *wild poliovirus importation belt* throughout 2009 reaffirmed that full implementation of the internationally agreed Polio Outbreak Response Guidelines work. Of the 15 countries infected in 2008 and 2009, 10 countries had stopped transmission by the second quarter of 2010.

Epidemiologically, it is clear that in 2010, there is a definitive opportunity to strike out the remaining pockets of wild poliovirus transmission in West Africa. As of the second quarter, 2010, Senegal, Mali and Mauritania continued to tackle the last remnants of the west Africa outbreak (Senegal was not infected until early 2010 and therefore is not included in the First Milestone). In west Africa, Guinea has not recorded any cases since November 2009, Burkina Faso since October, Côte d'Ivoire since August, Benin since April and Togo since March. In central Africa, Cameroon has not recorded any cases since October 2009, Burundi since September and Central African Republic since August. In the Horn of Africa, Kenya has not recorded any cases since July 2009, Sudan since June and Uganda since May.

Looking ahead

The *GPEI Strategic Plan 2010-2012* sets out stronger measures to reduce the international spread of poliovirus in Africa, including more aggressive mop-up activities to interrupt ongoing outbreaks, pre-planned campaigns and immunization systems strengthening, research on potential policies for reducing the risk of further importations (e.g. recommendations on the vaccination of travelers) and guidelines for more rapidly stopping outbreaks.

As of the second quarter of 2010, the outbreaks had stopped in all areas except pockets of Senegal, Mali and Mauritania. Continued multi-country immunization activities - intersected by SIAD campaigns where possible - are being held in areas of highest risk in an attempt to realize the first Milestone⁶ of the *GPEI Strategic Plan 2010-12*: to halt this outbreak by July 2010.

Evaluation summary

To limit further international spread of wild polioviruses, the Evaluation Team urged the Global Polio Eradication Initiative to work more closely with immunization systems to bolster routine coverage in districts neighbouring polio-infected areas and to focus polio campaigns on re-infected countries with poor routine coverage. The Evaluation Team recommended the vaccination of travellers at land crossing points between polio-infected and polio-free countries in sub-Saharan Africa, and supported the vaccination of other travellers wherever appropriate to reduce further the risk of international spread, as has been implemented during Hajj.

6 By mid-2010, cessation of all polio outbreaks with onset in 2009.

iv. Outbreaks of circulating vaccine-derived poliovirus (cVDPV)

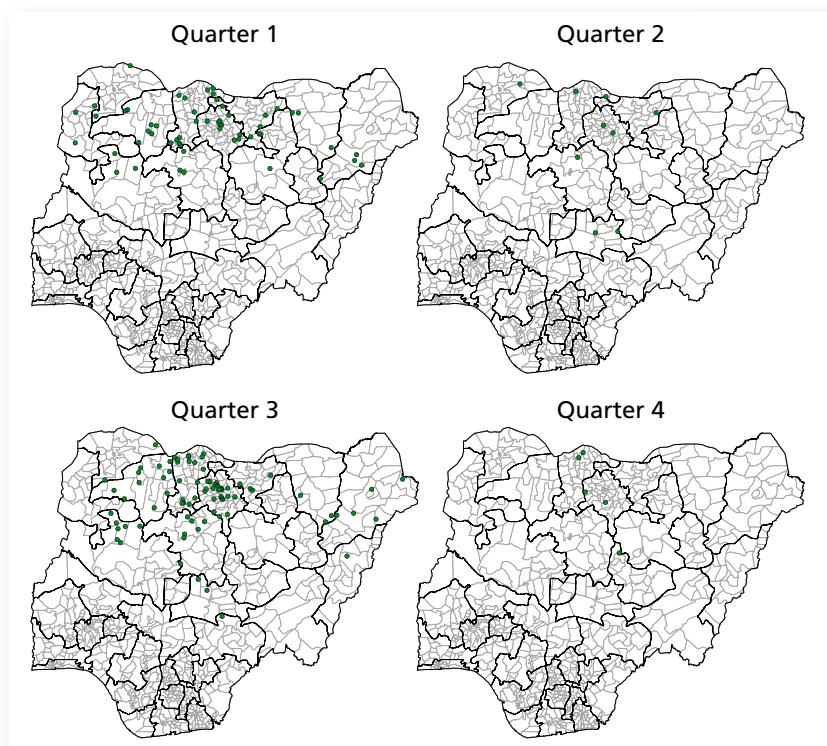
On rare occasions⁷, if a population is seriously under-immunized, the excreted live attenuated (weakened) virus contained in oral polio vaccine can find enough susceptible children to regain the ability to circulate in a population, and cause paralysis. If these viruses are allowed to circulate for an extended period of time, cVDPVs can regain a transmissibility and pathogenicity that is similar to that of wild polioviruses. Importantly, if a population is fully immunized against polio, it will be protected against the spread of both wild and vaccine strains of poliovirus. cVDPV outbreaks can be interrupted rapidly through the implementation of large-scale, high-quality SIAs using OPV.

In 2009, Nigeria continued to tackle a type 2 cVDPV, which clearly demonstrated that routine and supplemental immunization coverage with trivalent OPV (tOPV) in northern Nigeria had been poor. In May and August, 2009, Nigeria conducted nationwide supplementary immunization activities using trivalent



⁷ In the past decade, more than 10 billion doses of OPV have been administered to more than two billion children, preventing more than 3.5 million polio cases. In that same period, 13 countries have reported cVDPV episodes, resulting in 414 VDPV cases.

cVDPV cases in Nigeria in 2009



Nigeria: 153 type 2 cases

India: 15 type 2 cases

**Democratic Republic of the Congo:
4 type 2 cases**

Somalia: 4 type 2 cases

Ethiopia: 1 type 2 case, 1 type 3 case

Guinea: 1 type 2 case

OPV, and the significant improvement in the quality of these SIAs had immediate impact: by the end of August, Nigeria had recorded 148 cases; after the SIAs it recorded five cVDPV cases for the remainder of the year.

In 2009, type 2 VDPVs continued to circulate (from 2008) in the Democratic Republic of the Congo (16 cases total; 2 in 2009), Ethiopia (4 cases total; 1 in 2009) and Nigeria (319 total; 153 in 2009). New cVDPV type 2 outbreaks were detected in India (2 cases) and Somalia (2 cases). A single type 2 VDPV from an AFP case in Guinea was genetically linked to the outbreak in Nigeria. All episodes were responded to with local mop-ups and subsequent SIAs, using tOPV.

5.1 Assessment and strengthening of sub-national surveillance sensitivity

Certification-standard surveillance in polio eradication consists of a non-polio acute flaccid paralysis (AFP) rate of at least 1 per 100,000 of the population under 15 years of age, with stool specimens taken from at least 80% of AFP cases, all processed in a WHO-accredited laboratory. This section details the sensitivity of AFP surveillance globally and actions to maintain that sensitivity or increase it where necessary.

In polio-endemic regions, 56 out of 68 countries (85%) achieved or maintained certification-standard AFP surveillance, including 49 countries with AFP rates >2 per 100,000.

WHO Region	Reported AFP cases		Non-polio AFP rate		% AFP cases with adequate specimens	
	2008	2009	2008	2009	2008	2009
AFRICAN REGION	14,256	15,127	4.43	3.94	90%	89%
REGION OF THE AMERICAS	2,063	1,873	1.24	1.13	79%	79%
EASTERN MEDITERRANEAN REGION	10,799	10,607	4.60	4.40	91%	91%
EUROPEAN REGION	1,360	1,361	0.92	0.92	82%	84%
SOUTH-EAST ASIA REGION	50,509	54,968	8.10	8.66	84%	84%
WESTERN PACIFIC REGION	6,417	6,277	1.61	1.74	88%	87%
GLOBAL	85,404	90,213	4.61	4.89	86%	86%

Data as of 18 May 2010

Among polio-endemic regions, in the WHO African Region (AFR), 87.5% of countries had an AFP rate >1 per 100,000; 77% of countries had an adequate sample rate >80%; and 75% had both. In the Eastern Mediterranean Region (EMR), 91% of countries had an AFP rate >1 per 100,000; 82% of countries had an adequate sample rate >80%; and 78% had both. In the South-East Asia Region (SEAR), 81% of countries had an AFP rate >1 per 100,000; 63% of countries had an adequate sample rate >80%; and 54% had both.

In priority countries of polio-endemic regions, the recommended rate for operational purposes of two AFP cases per 100,000 children aged under 15 years was achieved by 39 countries out of 48 countries in AFR (81%), by 15 out of 23 countries in EMR (65%), and by six out of 10 countries in SEAR (60%).

The following 21 countries from polio-endemic regions did not reach certification-standard surveillance levels: Algeria, Botswana, Côte d'Ivoire, Equatorial Guinea, Guinea-Bissau, Mauritius, Niger, Reunion, Saint Helena, Sao Tome and Principe, South Africa, Seychelles in AFR; Cyprus, Djibouti, Kuwait, Lebanon, Morocco in EMR; Bhutan, Maldives, Sri Lanka, Thailand in SEAR.

Endemic countries

Overall, polio-endemic countries had good indicators at both national and provincial level with a non-polio AFP rate > 5. However, the detection of orphan viruses or long gaps in the detection of virus, especially in Pakistan, Afghanistan and in some parts of Nigeria, suggest gaps in field AFP surveillance. Specifically, concerns persist in the southern Punjab/Northern Sindh regions in Pakistan.

Regular internal surveillance reviews have been held in Nigeria at the state level and found ongoing surveillance gaps, which are being addressed by re-training staff in AFP case detection and reporting and reassessing their surveillance reporting network.

Surveillance strategies specifically targeting migrant/mobile populations are being implemented across the endemic countries, targeting these groups as key figures in the spread of polio.

Environmental surveillance has also been scaled up in India, Pakistan and Nigeria. Environmental sampling is a useful strategy in the hunt for the final, dwindling reservoirs of polio globally, allowing the GPEI to determine through sewage sampling whether the virus is circulating, even if AFP cases are not being detected.

Re-established transmission countries

In countries with re-established (or suspected re-established) transmission, persistent surveillance gaps had contributed to the ongoing circulation of wild poliovirus.

Chad has displayed improvements in surveillance since 2008, with an AFP detection rate that has increased by 32%, rising from 3.67 to 5.20 in 2009. All provinces have reported an AFP rate >2 , due to the establishment of three GPEI/WHO sub-offices in late 2008 and the deployment of 12 international consultants throughout 2009, improving active surveillance in the provinces. Some gaps remain, as proven by the identification of orphan virus in 2009. A surveillance review is planned for 2010.

Angola exceeded surveillance indicators in 2009 at national and provincial level, with all provinces reporting an AFP rate >2 . However, surveillance gaps clearly remain at sub-national level, with borderline indicators for several high-risk provinces and municipalities (districts), especially in Luanda and Benguela. Suspicion of surveillance gaps was confirmed when wild poliovirus was reported in April 2010 after seven months without detecting a case. A surveillance review is planned for 2010.

The Democratic Republic of the Congo's surveillance indicators fell from 2008 figures, though they exceeded the operational target at national and provincial level for countries with importations. However, when a child in bordering Burundi was paralyzed by wild poliovirus in September 2009, and this case was genetically linked to previous circulation in Democratic Republic of the Congo which had circulated undetected for 13 months - it was apparent that sub-national surveillance gaps persisted, at least in the east of the country. A risk assessment and full external surveillance review is planned for 2010.

Southern Sudan's AFP rate of 2.36 may have exceeded certification standard, but the Horn of Africa Technical Advisory Group remained very concerned about the quality of surveillance in southern Sudan. Throughout the year, two out of 10 states did not meet the operational rate of 2/100,000, and in the last six months of 2009, southern Sudan witnessed a significant decrease in the detection of AFP cases. A surveillance review was carried out in early 2009, and another is planned for 2010. Technical support has been scaled up - as recommended by the *Independent Evaluation* - with 11 eSTOP consultants deployed at the provincial level.

Wild poliovirus importation belt

Overall, countries reached certification-standard surveillance at the national level, and a non-polio AFP rate >2 . However, surveillance gaps persisted at the sub-national level in West Africa (particularly Burkina Faso and Guinea) and in southern Cameroon and Ethiopia/Somalia, as demonstrated by sequencing data. Overall, there is a need to strengthen surveillance to be able to determine the extent of the outbreak and to detect any new importations in polio-free areas.

Cameroon, with its proximity to Chad and Nigeria and inadequate surveillance levels, has a high risk of importation and of late detection of an importation. **Côte d'Ivoire, northern Benin, Burkina Faso and Guinea** also have isolated surveillance gaps. Cameroon has planned a surveillance review for 2010, while technical support is being scaled up with the use of STOP teams in these other at-risk countries.

Polio-free regions

In polio-free regions, 25 out of 80 countries with a population >1 million (31%) achieved or maintained certification-standard AFP surveillance. Among polio-free regions, in the WHO Region of the Americas (AMR), 52% of countries had an AFP rate >1 per 100,000; 43% of countries had an adequate sample rate $>80\%$; and 26% had both. In the European Region (EUR), 34% of countries had an AFP rate >1 per 100,000; 42% of countries had an adequate sample rate $>80\%$; and 30% had both. In the Western Pacific Region (WPR), 75% of countries had an AFP rate >1 per 100,000; 37% of countries had an adequate sample rate $>80\%$; and 25% had both.

In 2009, the EUR surveillance levels (0.92 AFP cases per 100,000) fell below the required certification standard surveillance level of 1 per 100,000 children. Low surveillance levels are accompanied by a very high risk of undetected or late detection of a polio outbreak if it occurs. EUR is not alone in failing to maintain certification-standard surveillance – AMR and WPR had 71% and 75% of their countries, respectively, fail to reach the agreed standards. In polio-endemic regions, AFP surveillance levels also witnessed a decline. Given this trend, it is a priority of the *GPEI Strategic Plan 2010-2012* to reinvigorate AFP surveillance in the polio-free regions, with increased oversight by the Regional Certification Commissions over Member States.

Surveillance reviews

By end 2009, external AFP surveillance reviews were conducted in Indonesia, Kenya, Sudan, and parts of Nigeria, Pakistan and India. Desk surveillance reviews were conducted in the central block of Africa. Ongoing desk surveillance reviews are taking place in the sub-Saharan outbreak countries.

Looking ahead

Enhancing poliovirus surveillance and outbreak response is one of the four strategic priorities of the *GPEI Strategic Plan 2010-2012*. Surveillance figures fluctuate from year to year, and a focus of the new Strategic Plan is to ensure that surveillance levels are more consistent. New approaches are designed to address known sub-national surveillance gaps in endemic and re-infected regions, expand environmental surveillance in key endemic areas and re-invigorate AFP surveillance in polio-free regions. Enhanced surveillance in 2010-2012 is a critical cornerstone strategy to ensure the most rapid response to detection of new polio cases. In such a way, the risk of subsequent large-scale outbreaks, particularly in polio-free areas, is reduced.



5.2 Global Polio Laboratory Network (GPLN)



Personnel from 50 laboratories in six WHO regions were trained at six training workshops in 2009, thanks to support provided through USAID and Rotary International.

A global network of 145 laboratories underpins the GPEI, with the primary responsibility of analysing and characterizing polioviruses from acute flaccid paralysis (AFP) cases, although samples and viruses from non-AFP sources are sometimes analysed on the request of national authorities, or for special studies. In 2009, the network tested 171,470 faecal samples from 87,014 AFP cases and 15,217 samples from non-AFP sources (usually healthy contacts of AFP cases or sewage waters). The AFP workload represented a 9% overall increase compared to that of 2008. As in previous years, workload increases occurred mainly in the three polio endemic regions of Africa, Eastern Mediterranean and South East Asia.

The network reported a total of 1,604 wild poliovirus positive AFP cases from 23 countries in 2009. The ratio of type 1 to type 3 cases was 1:2.3. Five countries (Afghanistan, India, Niger, Nigeria and Pakistan) had both type 1 and type 3 detected, four countries (Cameroon, Chad, CAR, Democratic Republic of the Congo) reported only type 3 cases and the remaining 14 countries only reported type 1. There was no type 2 wild poliovirus detected in any location.

WPV detection in non-AFP specimens: Positive contacts of AFP cases were found in several countries. Additionally, both WPV1 and WPV3 were isolated intermittently from sewage samples collected in Mumbai (Maharashtra Province) in India and these isolates were predominantly related to viruses circulating in the north of the country. Testing of sewage was implemented for the first time in Pakistan, starting

in July 2009, and specimen collection is so far limited to the provinces of Sindh and Punjab. In Lahore-Punjab, WPV1 was detected only once in August 2009, while in Karachi-Sindh, WPV3 isolates were found almost monthly, along with less frequent WPV1 detection.

VDPV: Some VDPVs found in Democratic Republic of the Congo, Ethiopia, India and Somalia represented VDPV emergences separate to the circulating lineages and were considered to be of ambiguous origin, as were VDPVs found in several other countries:

- Afghanistan (type 2 VDPV from two AFP cases and 1 contact)
- China (type 2 VDPV from 1 AFP case)
- Estonia (type 3 VDPV found in a sewage specimen from Tallinn)
- Finland (VDPVs of all 3 serotypes found in the sewage in the city of Tampere)
- Israel (type 2 VDPVs continued to be detected in sewage without source patients identified, consistent with trends from several previous years)

VDPVs were also isolated from immunodeficient, paralysed persons in Colombia (one VDPV type 2), Argentina (one VDPV type 1) and Minnesota, USA (one VDPV type 2).

VDPV detection: In June 2009, a real time polymerase chain reaction (rRT-PCR) was formally adopted by the network for screening for VDPVs. This followed field evaluations successfully conducted in 10 network laboratories between 2008 and mid-2009 that documented higher VDPV screening sensitivity for the rRT-PCR than the previously used ELISA procedure.

Lab Network Quality Assurance Program: WHO continues to coordinate a quality assurance programme for the laboratory network, using a combination of on-site performance reviews, annual proficiency tests and weekly review of results to evaluate the accuracy and timeliness of reporting. Overall, 138 laboratories (95.2%) were fully accredited by WHO in 2009. There were two provisionally accredited laboratories, situated in Kuwait and Uganda. Three laboratories (located in Venezuela, Belem-Brazil and China-Tibet) were non-accredited because they failed the annual proficiency test. Specimens referred to these locations are being

tested in parallel in accredited laboratories. Staff changes in Venezuela were linked to poor performance and corrective action (including training of personnel) has been taken with a positive impact, as the laboratory subsequently scored 100% in the proficiency test distributed in December 2009. Performance problems identified in Ghana, CAR and Zimbabwe in the period 2008 to 2009 have been resolved. Ghana and Zimbabwe were fully accredited by WHO by December 2009. CAR passed the proficiency test with a score of 100% in 2009, and its performance is scheduled to be further evaluated on-site in March 2010. Two new laboratories (in Canada and Cuba) were added to the network in 2009, and two sub-national laboratories in India and Brazil were inactive.

POLIO LABORATORY NETWORK TRAINING

The implementation of new real-time polymerase chain reaction (rRT-PCR) procedures for intratypic differentiation of polio viruses and screening for

VDPVs was a high priority for the network in 2009. Personnel from 50 laboratories in six WHO regions were trained at six training workshops, thanks to support provided through USAID and Rotary International. The introduction of rRT-PCR procedures has led to a decline in reporting times for ITD and an increase in demand for sequencing of polioviruses.

Support continued to be provided to the African region for sequencing of wild polioviruses at the reference laboratory in South Africa. Continued endemic WPV transmission in Nigeria and occasional outbreaks in other countries due to imported WPV viruses justified the need for maintaining regional sequencing capacity. The sequencing workload in South Africa increased in 2009 because of WHO's recommendation to retrospectively screen sabin-like polioviruses for VDPV, linked to the introduction of the new rRT-PCR procedures. In 2009, the reference laboratory in South Africa sequenced 846 polioviruses, among them WPV from 325 cases and VDPVs detected in outbreaks in the Democratic Republic of the Congo, Somalia and Ethiopia.

LABORATORY ACCREDITATION STATUS: 2009

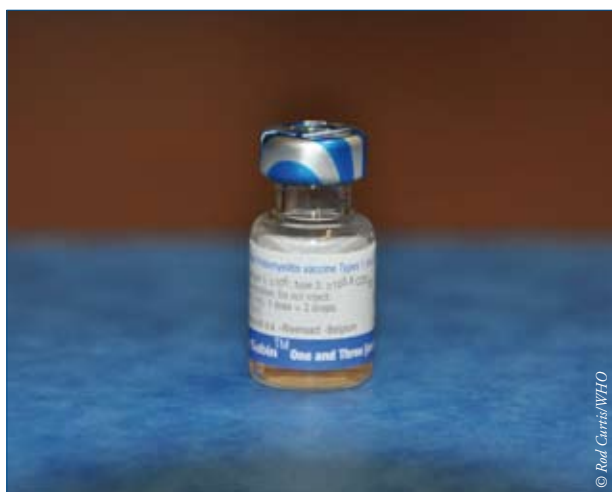
Type	Accredited	Provisional	Failed	Pending	Totals
Global	7	0	0	0	7
Regional Reference Laboratories (RRL)	14	1	0	1	16
National Laboratories(NL)	78	1	1	1	81
Total	99	2	1	2	104
Percentage					
Sub-National Laboratories	39	0	2	0	41
Percentage	100%	-	-	-	100%
All Laboratories	138	2	3	2	145
Percentage	95.2%	1.4%	2.1%	1.4%	100%

As of 12 February 2010

138 laboratories were fully accredited, 2 (Kuwait and Uganda) were provisionally accredited. Three laboratories (sub-national laboratories in Brazil and China and a national laboratory in Venezuela) were not accredited.

6. Development and evaluation of new tools

In 2009, a major element of the special one-year *Programme of Work* was the development of new tools in polio eradication, which serve many purposes, from operational to scientific. A new vaccine may increase the impact of each vaccination contact. A new screening technique may detect the presence of poliovirus more quickly than before. A new sampling methodology may more efficiently identify areas where children are not being reached with vaccine.



Bivalent oral polio vaccine.

Bivalent OPV

A KEY new tool in the fight against wild poliovirus was used for the first time on 15 December 2009, in polio immunization campaigns in Afghanistan. Bivalent oral polio vaccine (bOPV) is a critical development in the polio eradication effort – in mid-2009 it was found to be highly efficacious against both surviving serotypes of polio (types 1 and 3) concurrently, effectively delivering double the benefit in one dose.

From 15-17 December in Afghanistan's southern regions, 2.8 million children under five received this vaccine for the first time. In conflict-affected regions like Afghanistan, where accessibility can be limited, the ability to optimize immunity to both serotypes in one dose helps maximize the impact of each activity. Further, Afghanistan had reported 15 type 1 and

16 type 3 cases to December, 2009, underlining the benefit of a vaccine which simultaneously targets both serotypes.

All endemic countries - Nigeria, India, Pakistan and Afghanistan - have both type 1 and 3 wild polioviruses circulating. bOPV maintains the pressure on type 1 polio, with its higher paralytic attack rate and greater propensity for international spread, while raising immunity to type 3, which this year has recorded more than 1000 cases, mostly in India and Nigeria.

Ahmad Farid Raaid, spokesman for the Islamic Republic of Afghanistan's Ministry of Public Health, said the country was "honoured" to carry out this historic campaign with this new vaccine. "We really are very happy for Afghanistan to have this achievement of being the first country to use this new vaccine," Mr Raaid said. "We are hopeful that the efficiency, cost-effectiveness, and operational advantages of this new vaccine will help us quickly see the number of polio incidents come down."

The roll-out of bOPV followed a five-arm clinical trial (randomized, double-blind) held in Indore, Pune and Chennai, India, where 1000 children were enrolled. From March to June 2009, bOPV, mOPV1, mOPV2, mOPV3 or tOPV were administered to children in each of the five arms, with one dose at birth and another at 30 days. The results found that bOPV, despite containing both type 1 and 3 serotypes, was clearly superior to the trivalent vaccine and almost as good as the respective monovalent OPVs. (By including mOPV2, the trial also provided the first clinical data on this product.) Combined with ongoing large-scale use of mOPVs, the new bOPV will offer the significant logistical advantage of only having to deliver a single product to target both remaining serotypes simultaneously.

Following recommendations for its large-scale use by a number of key bodies, including the Advisory Committee on Poliomyelitis Eradication (ACPE) and the *Independent Evaluation*, bOPV was used in Afghanistan in December 2009 and in the other endemic countries in the first quarter of 2010. The rapid scale-up of the new bOPV is expected to be a cornerstone approach to optimizing supplementary immunization activity (SIA) strategy during the life of the new *GPEI Strategic Plan 2010-2012*.

Inactivated polio vaccine and high-potency type 1 monovalent OPV

A clinical trial was conducted in Moradabad district, western Uttar Pradesh, India, in April and May 2009 to more closely explore various approaches to close any residual immunity gaps to type 1 poliovirus in infected areas. The trial evaluated five arms: a standard-potency mOPV1; a high-potency mOPV1; two inactivated polio vaccines (IPV) from separate manufacturers administered whole-dose (intramuscularly); and, an IPV at a fractional dose (1/5th) given intra-dermally by needle-free device.

Contrary to expectations, the study found that at baseline, over 99% of children already had developed immunity to polio due to the intensive mOPV1 campaigns, underlining the high efficacy of this vaccine. For types 2 and 3, intramuscular whole-dose IPV and IPV-ID boosted immunity. Further trials will be implemented to better understand the comparative impact of OPV versus IPV in closing both humoral and mucosal immunity gaps against all serotypes.

Seroprevalence surveys

To more accurately verify both operational performance and vaccine efficacy, and to provide a clearer picture of population immunity levels, a seroprevalence survey was conducted in Moradabad, India, from November 2008 until August 2009. Antibody levels were assessed in 1,002 children, aged six to nine months old.

The study found that the proportion of very young children who had seroconverted to type 1 poliovirus in western Uttar Pradesh had increased to 97.5% in 2009 from the 85% found in a similar study in late 2007.

These results have been integral in helping to inform the *GPEI Strategic Plan 2010-2012*, suggesting that high levels of population immunity can be achieved through a concerted effort with mOPV1, albeit historically this has been at the cost of lower levels of immunity to type 3 polio. Most evidence now suggests that remaining immunity gaps in the general population are primarily to type 3 polio, and to type 1 among mobile populations and the hard-to-reach. The *GPEI Strategic Plan 2010-2012* has elucidated new approaches to increasing immunity levels simultaneously to type

1 and 3 by rapidly scaling-up the use of bOPV, and by implementing additional tactics to identify and reach mobile populations, in western UP, Bihar and in destination states.

The use of seroprevalence surveys will be extended in 2010 to other urban reservoir areas, including in Pakistan and Kano, Nigeria.

Independent monitoring of Supplementary Immunization Activity coverage

In November 2009, the GPEI implemented a real-time independent monitoring system to improve the quality and impact of eradication strategies. In order to more rapidly identify poor-performing areas for immediate re-vaccination, and to guide corrective action in advance of the next SIA, a standardized independent monitoring module was developed. This module is now systematically being completed and the results made internationally available on the www.polioeradication.org website within 15 days of an SIA being conducted.

In September 2009, AFRO conducted an analysis of the independent monitoring data being made available following an SIA in that region, focusing on countries with active wild poliovirus outbreaks. This analysis found that data was being collected in an irregular – and occasionally untimely – manner, which affected the programme's ability to rapidly respond to SIA coverage gaps. Subsequently, a standardized reporting process, templates and tools were trialled, with the initial results shared with the November 2009 meeting of the ACPE, who recommended that "Independent monitoring of SIAs using new guidelines should be implemented as rapidly as possible in all re-infected countries, and monitoring results should be made available within 15 days of each immunization round".

As a result, the *GPEI Strategic Plan 2010-2012* institutionalized standardized 'real-time' independent monitoring across the eradication programme. Each report now includes the number and source of independent monitors, the number of children monitored, the percentage of children found unimmunized (i.e. without any finger marking) – both inside the house and outside – the reasons children were missed (i.e., absent, due to caregivers' refusal),

whether parents were aware of the SIA prior to the activity and the number and percent of sub-districts monitored. Standardized materials and protocols have been developed for this purpose, and staff have been trained in the new system across the *wild poliovirus importation belt*.

Lot Quality Assurance Surveys

Consistently reliable monitoring data of SIAs is a key factor to ensuring polio eradication strategies are effectively implemented. In 2009, additional tools were assessed to supplement independent monitoring data in areas where the results were not consistent with either the local epidemiology of polio or other data on programme performance. As part of the new *GPEI Strategic Plan 2010-2012*, the World Health Organization has been adapting and testing the Lot Quality Assurance Sampling (LQAS) method, which classifies areas of interest (corresponding to “lots”) as having acceptable or unacceptable levels of SIA coverage.

Conducting LQAS surveys in the field is labour-intensive but relatively straightforward: if in a sample of individuals the number of unvaccinated exceeds a pre-set decision value, then the area (lot) is classified as having an unsatisfactory level of vaccine coverage and mop-up activities are recommended. Targeted application of LQAS can supplement full independent monitoring mechanisms as a tool to detect pockets of low vaccine coverage and direct focused vaccination efforts.

Given the international importance of stopping polio in Nigeria and its substantial decline in cases, LQAS was first carried out in Nigeria to help resolve discrepancies in coverage data. The GPEI piloted a study to assess OPV coverage in 20 local government areas LGAs in five high-risk states using LQAS during the November 2009 Immunization Plus Days. Two LGAs were accepted at target coverage of 90%, seven were rejected with coverage below 90%, a further seven were rejected with coverage below 70%, and four were rejected with coverage below 50%.

The pilot proved that LQAS is feasible and useful for the polio eradication programme as a supplementary tool to efficiently monitor and guide future OPV campaigns in priority areas.

Real-time Polymerase Chain Reaction:

In 2008 and 2009, new rT-PCR assays to improve screening for VDPVs were evaluated and introduced into the GPLN. Programme experience with this new method was assessed in June 2009, at the annual Informal Consultation of the GPLN in Geneva, Switzerland. The Informal Consultation found that, among other benefits, this new system was as much as 30% more effective at screening for VDPVs than traditional methods.

By end-2009, 34 laboratories within the GPLN, including 21 laboratories in the three endemic Regions, had capacity to conduct rT-PCR as a standard operating procedure. It is expected that the new procedure will be fully rolled out to all eligible laboratories within the GPLN by end-2010.

This new laboratory procedure will play an important role in the *GPEI Strategic Plan 2010-2012*, to further enhance detection to all polioviruses (including VDPVs) with view of facilitating a more rapid outbreak response as necessary.



Real-time independent monitoring of immunized children, based on finger-marking data, will allow the GPEI to rapidly identify poor-performing areas for revaccination.

7. Management of post-eradication risks

7.1 Certification of interruption of transmission



Laboratory personnel prepare a mix for real-time RCR testing of poliovirus isolates, enabling the programme to quickly differentiate vaccine and wild polioviruses.

Regional Certification Commissions (RCCs) and National Certification Committees (NCCs) continue to meet in the three WHO Regions where endemic wild poliovirus circulation has not yet been interrupted, in order to prepare for the eventual certification of the entire Region as free of circulating wild poliovirus.

RCCs conduct detailed country-by-country reviews in coordination with NCCs. Once no wild poliovirus has been found for at least three years in the presence of certification-quality surveillance, NCCs submit final certification documentation, for scrutiny and, if satisfactory, eventual acceptance by the RCC.

In 2009, the number of countries from which RCCs have accepted final certification documentation – indicating that the country was free of circulating wild poliovirus at the time of submitting their documentation – increased from 19 to 20 in the Eastern Mediterranean Region (of 23 member states), remained at nine (of 11 member states) in the South-East Asian Region, with India and East Timor still pending, and increased from 24 to 25 in the African Region (of 46 member states).

However, in 2009, imported wild poliovirus was detected in nine of the 25 AFRO countries for which the RCC

had previously accepted full national documentation. These countries will have to re-submit evidence to show transmission of the imported wild poliovirus has stopped for at least one year, with certification-quality surveillance.

2010 is the 10th anniversary of the polio-free certification of the Western Pacific Region. To sustain polio-free status through maintaining well-performing immunization services and sensitive AFP surveillance, RCCs and NCCs were maintained following regional certification in both the Western Pacific (2000) and the European Region (2002). RCCs in both Regions met in 2009 and reviewed the quality of activities towards sustaining polio-free status at country level.

At its fifth meeting in March, 2010, the PAHO American Regional Commission for Certification of Poliovirus Laboratory Containment and Verification of Polio-free Status stated that Phase 1 laboratory containment was achieved in the region. The RCC also reaffirmed its terms of reference to support all countries of the Region in maintaining their polio-free status. The RCC will continue to meet annually and evaluate and review detailed country-specific data on immunity levels and surveillance quality, particularly in member states with sub-optimal performance.

7.2 Containment of poliovirus materials

The WHO Region of the Americas completes Phase I containment

The completion of Phase I in the WHO Region of the Americas (AMRO) was made official in March 2010 and as a result, all three WHO Regions certified as polio-free have completed the first phase of containment. After identifying and surveying more than 60,000 biomedical laboratories in the 43 countries and territories of the WHO Region of the Americas, 215 facilities in nine countries have been identified to be holding wild poliovirus materials.

AMRO was the first region to eradicate polio, in September, 1994. When the Western Pacific (WPRO) and European Regions (EMRO) passed the polio-free landmark (in 2000 and 2004, respectively), the need to address the issue of wild poliovirus stocks in facilities increased. In 2004, the AMRO Director established the American Regional Commission for the Certification of Poliovirus Laboratory Containment and Verification of Polio-free Status (AMR RCC) to oversee Phase I containment activities.

Phase I wild poliovirus containment requires that countries conduct a national survey of all biomedical facilities and establish an inventory of all laboratories and institutions identified with wild poliovirus materials. The United States of America and Canada began the process in 2000-2002, establishing teams to coordinate a large-scale survey of national laboratories and by 2004, nearly 200 facilities were identified with wild poliovirus materials.

After 2004, the AMR RCC, PAHO, and WHO/HQ provided technical assistance to the remaining countries and

territories of the Region through seven regional and sub-regional meetings. Laboratories and institutions in the national databases included over 10,000 hospitals, 2500 research laboratories, 1150 environmental agencies, and tens of thousands of government and private diagnostic-type laboratories. Each country classified these laboratories as low, medium, or high risk, based on the likelihood of storing wild poliovirus and evaluating their capacity and the nature of their activities.

In most cases, electronic surveys and letters were sent to the laboratories from the Ministries of Health or the National Certification Commission Chair. If a laboratory or institution failed to respond, personnel conducted on-site visits. Members of the task force visited high-risk laboratories and institutions that reported possessing infectious or potentially infectious wild poliovirus materials. Each country compiled a report of the process with the National Inventory of facilities, and these were evaluated at the national level before being submitted to the AMR RCC for final review.

The status of wild poliovirus materials in the 215 facilities will be monitored by the nine countries and AMRO. The *Global Action Plan to minimize poliovirus facility-associated risk in the post-eradication/post-OPV era (GAPIII)* provides the strategy for further containment. When one year passes without a wild poliovirus case globally, the level of containment and government oversight for wild poliovirus materials will be limited to a few facilities essential for achieving the global cessation of OPV and long-term poliovirus risk management (vaccine, quality control, and research facilities). At the time of OPV cessation, all live polioviruses, including OPV and related viruses, will be contained, regulated, and limited to a handful of facilities.



Wild poliovirus materials being destroyed.

7.3 Research and development of products and policies

Following the 2008 World Health Assembly resolution stating that the cornerstone to the management of the long-term risks of vaccine-associated polio paralysis (VAPP) and VDPVs must be the eventual cessation of the use of OPV in routine immunization programmes (Resolution WHA61.1), an extensive programme of research was accelerated in 2009 to develop the tools and policies to minimize and manage the long-term risks of polio.

To prepare for the management of long-term poliovirus risks, the GPEI is focusing research and policy development on three major areas:

- 1) Better characterizing the primary long-term poliovirus risks (ie cVDPVs, VAPP, iVDPVs and residual stocks of WPVs, VDPVs and Sabin viruses) ;
- 2) Developing new products to manage the risks associated with OPV cessation, including the development of an international stockpile of mOPVs for cVDPV response and affordable IPV options for low-income countries that perceive the medium- or long-term risks of poliovirus warrant continued routine immunization after OPV cessation.
- 3) Establishing mechanisms to internationally coordinate risk management strategies, particularly the application of appropriate safeguards and bio-containment conditions for the handling and storage of residual polioviruses and potentially poliovirus-infected materials, the synchronization of the cessation of routine immunization with OPV and the adherence to internationally-agreed processes for the post-eradication use of OPV in response to new cVDPVs.

The following section reports briefly on some of the salient developments in each area. More detailed information is available in the newsletter *Polio Pipeline* and on www.polioeradication.org.

Vaccine-derived poliovirus

Research work to better characterize the risks of VDPVs – in particular, the risks of immuno VDPVs – is being expanded. A multi-country study series on the prevalence of iVDPV is in various stages of implementation: in China, the Russian Federation and Tunisia, studies are nearing completion; in the Philippines and Sri Lanka, studies began in early 2010; in Bangladesh and Senegal, the studies are near start-

up phase. Egypt is in the planning stages of establishing an iVDPV surveillance system which will be integrated into the existing AFP surveillance system.

Affordable IPV options

Throughout 2009, the research agenda on establishing affordable IPV options for low-, low-middle- and middle-income settings was expanded. The collaboration between the Netherlands Vaccine Institute (NVI) and WHO entered into the clinical development phase on the Sabin-IPV project. To date, this collaboration demonstrated immunogenicity of Sabin-IPV in rats and produced clinical trial material under Good Manufacturing Practices. Six developing country manufacturers have expressed a written interest in technology transfer. In 2010, the NVI/WHO collaboration will select manufacturers that are most committed and capable of supplying IPV internationally as the first two recipients of the technology.

In 2009, trials on intradermal IPV delivery using 1/5th of a standard dose were completed in Cuba and Oman. Following these trials, in 2010, needle-free devices will be introduced in a pilot project in Oman with tuberculosis vaccine BCG (including IPV).

WHO has established five collaborations (two with the State University of New York and one each with United States Centers for Disease Control and Prevention, the National Institute for Biological Standards and Control in the United Kingdom and at the University of California, San Francisco) to assess different approaches for development of further attenuated poliovirus strains for IPV production. These include an evaluation of a packaging cell approach to manufacture IPV in a non-infectious manner. Proof-of-principles studies in animals are expected to be completed on most of these approaches by end-2010. In October 2010, the Polio Research Committee (PRC) is expected to conduct a preliminary feasibility assessment and select approaches for further development.

Containment

As part of the extensive, multi-year process for establishing international consensus on the long-term containment of polioviruses, the third edition of GAPIII was updated in 2009 and circulated for public comment. A revised version of GAPIII will be circulated for final endorsement and subsequent publication in 2010.

Work also continued towards an initial tender for bulk vaccine for a stockpile of mOPV in the post-eradication era. UNICEF's Supply Division, with support from WHO, developed a 'request for proposals', issued to all polio vaccine manufacturers, and all interested manufacturers have submitted proposals to participate in the mOPV stockpile project. In early 2010, the technical specifications of these proposals were reviewed by WHO, with assessments provided to UNICEF's Supply Division, which will undertake final review and awards in 2010.

Antivirals

The evaluation of the role of antivirals in the post-eradication era continued. Antiviral compounds against poliovirus may be important in the post-eradication era to clear chronic poliovirus infection

among current and future chronic excretors, to be used as post-exposure prophylaxis among laboratory and production workers exposed to poliovirus, and possibly to serve as an adjunct to vaccines in responding to polio outbreaks. The Poliovirus Antivirals Initiative (PAI), led by the Task Force for Global Health in Atlanta, USA, in partnership with WHO, CDC, the Food and Drug Administration (FDA) and the National Institute for Allergy and Infectious Disease (NIAID), has the mandate to develop antiviral compounds for the GPEI. The PAI is currently in the process of determining if selected antiviral candidate compounds are safe and have the capacity to prevent, reduce or stop virus shedding in a planned phase I clinical trial. If successful, these 'proof of principle' studies could lead to the development of these compounds for regulatory approval, for use of these antivirals as treatment of persons chronically shedding poliovirus.



The GPEI is expanding its research on the development of affordable IPV options.

7.4 Mainstreaming the Global Polio Eradication Initiative (GPEI)



In India, the comprehensive mapping of under-served and migrant populations means that the most marginalized, mobile populations have been registered to receive OPV and other health services - many for the first time.

The GPEI is the world's single-largest internationally coordinated public health effort, and as such has developed a comprehensive public health infrastructure in some of the world's most under-served communities.

In 2009, this network was required to respond to a wide range of challenges, particularly a debilitating meningitis outbreak that swept West Africa, and then the H1N1 "swine flu" pandemic that captured the attention of the world. The GPEI Surveillance and Global Laboratory Network was called upon to identify and test for both these outbreaks in 2009, while polio-funded Surveillance Medical Officers (SMOs) in many countries of Asia and Africa were trained in swine flu surveillance and preparedness.

As a result of the 2009 GPEI Programme of Work, which introduced a raft of successful district- and population-specific strategies, the polio eradication programme focused much of its efforts in 2009 on identifying, reaching and immunizing migrant and under-served populations. Consequently, whole groups of previously neglected migrants, minorities or itinerant workers have been identified, mapped and brought to the attention of national health authorities - from construction sites in India to brick kilns in Nepal to conflict-affected regions of Afghanistan to tribal groups in Nigeria, opening up access to routine immunization services, child health days and other essential health interventions.

The GPEI benefited immunization system strengthening in multiple countries, with a wide range of activities

supporting dissemination of, among others, Vitamin A, measles vaccine, TT and zinc. The continued strengthening of immunization systems is an objective of the new *GPEI Strategic Plan 2010-2012*, with particular focus on high-risk areas of the sub-Saharan Africa importation belt.

In India, the establishment of the Kosi River Plan dramatically increased the number of SMOs in a notoriously difficult-to-access area, complemented by the building of satellite offices and overnight stay huts, which allows for long-term, targeted health outreach for the first time. The 107-Block Plan, too, provides a rigid architecture in which to integrate broad health interventions in UP and Bihar. In addition to a specific focus on improving routine immunization and the quality and reach of supplementary immunization activities, the plan outlines improvements to the water and sanitation infrastructure, which has far-reaching health benefits.

In Nigeria, the engagement of the Traditional Leadership on polio eradication has provided a forum for health interventions that has never previously existed. This is both an opportunity for broader health interventions and something of a risk: unless the GPEI can deliver on polio eradication in Nigeria, the Traditional Leadership may be reluctant to lend their names so strongly to health interventions in the future.

Finally, the GPEI developed a widespread Independent Monitoring mechanism across sub-Saharan Africa and in Pakistan in 2009 that can easily be transferred for use by a range of health interventions.

8. Finalization of multi-year Strategic Plan and budget

In 2008, the World Health Assembly (WHA), recognizing that the core eradication strategies that had stopped polio in 99% of the world were not working in the remaining 1%, called for a new strategy to eradicate polio from the remaining affected countries.

The one-year *Programme of Work 2009* was constructed in order to inform this new strategy by evaluating new tactical innovations in each disease-endemic area, conducting clinical trials of new OPV formulations and polio vaccine approaches, and facilitating the recommendations of the *Independent Evaluation of the Major Barriers to Stopping Wild Poliovirus Transmission*. This evaluation independently scrutinized the primary reasons why polio persisted in these areas, and what additional tools or approaches might be necessary to secure success. Leading experts in the fields of public health, virology, security, social mobilization, vaccinology and others determined that a 'one size fits all' approach could not work, as the barriers to success in each of these areas were inherently unique, and detailed a series of recommendations to tackle them.

In the second half of 2009, a major consultative process was undertaken between GPEI spearheading and donor partners, polio-infected countries, polio technical advisory bodies, core donors, spearheading partners and other major stakeholders to discuss potential elements of a new Strategic Plan based on the outcomes of the *Programme of Work 2009*. On the recommendation of a number of partners and agencies, the GPEI moved from a detailed multi-year work plan (that could be quickly outdated) to a Strategic Plan which would be more robust and more appropriate to policy-level discussions and decisions. Late in 2009, the outcomes of the GPEI's *Programme of Work 2009* were evaluated by two groups: the SAGE and a special consultation of the ACPE, which met with technical experts, polio-infected country health authorities and major stakeholders, including donor partners, to discuss the plan.

After incorporating the recommendations of all parties, the draft Strategic Plan was presented to the WHO Executive Board in January 2010, which after undergoing detailed discussions, made its recommendations to the Plan. Further discussions were held with implementing country programmes and governments in advance of the World Health Assembly. Finally, the *GPEI Strategic Plan 2010-2012* was launched at a key stakeholders meeting in Geneva in June 2010.

Underpinning the *GPEI Strategic Plan 2010-2012* are area and population-specific approaches to interrupting wild poliovirus transmission, with different approaches for reaching the critical immunity thresholds in Asia and Africa. In addition, the Plan institutionalizes a range of lessons learnt from 2009, including the rapid scale-up of the new bivalent OPV; the use of special teams and tactics to reach under-served populations and communities (including special tactics for security-compromised areas); new mechanisms to engage sub-national political leadership (and track that engagement); standardized, real-time independent monitoring delivering quality indicators to provide an accurate picture of the quality of SIAs within two weeks of the activity; enhancing targeted social mobilization activities; new measures to limit international spread of polio (including through the strengthening of immunization systems in areas at highest risk of outbreaks); and, new ways to independently verify the quality of implementation of the new operational approaches.

Accompanying the *GPEI Strategic Plan 2010-2012* is the *Financial Resource Requirements* (FRR) document, presenting a corresponding three-year budget to successfully interrupt wild poliovirus transmission globally and prepare for the post-eradication era. Reviewed and updated quarterly, the FRR, together with the Strategic Plan, is available at www.polioeradication.org.

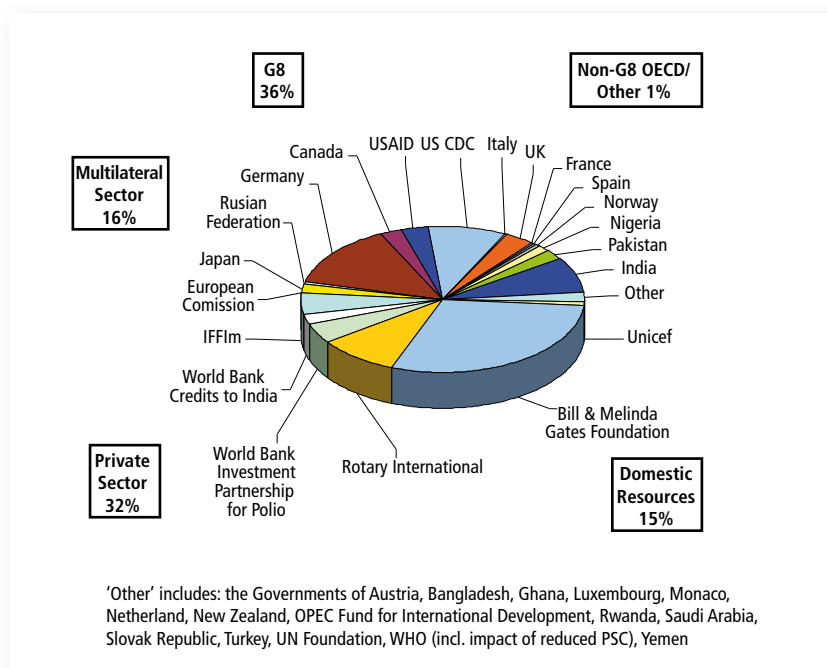
Fully implementing the *GPEI Strategic Plan 2010-2012* requires mobilizing US\$750-800 million per year, in domestic and international financing. At January 2010, approximately 50% of the necessary financing had been secured, with sound prospects for a further 25%. However, the remaining funding gap poses important short- and medium-term risks for the successful implementation of the *GPEI Strategic Plan 2010-2012*. The justification for further financing to complete the job of polio eradication is sound, both from a humanitarian and economic perspective: failure to achieve success would have significant humanitarian and economic consequences.

8.1 Financing Review 2009

Public/Private Commitment Gives Boost to Eradication Effort

The year 2009 began with a major public/private sector funding commitment to boost the polio eradication effort. The Bill & Melinda Gates Foundation, Rotary International, and the British and German governments together announced more than US\$ 630 million in support of the GPEI. On 21 January, the Bill & Melinda Gates Foundation announced it was awarding a second \$255 million challenge grant to Rotary, which Rotary will match with \$100 million from its members over the next three years, bringing Rotary's matching commitment to \$200 million. Rotary's contribution to the GPEI with this funding partnership will exceed \$1.2 billion. The United Kingdom committed \$150 million in fully flexible funding over the next five years. Germany announced its intention to provide \$130 million over the same period and the GPEI continues to work with Germany to operationalize its pledged funding. Additionally, of note, were the multi-year commitments made in 2009 by Luxembourg and Spain.

Financial Contributions for 2009



G8 reaffirm support in 2009

Mid-year saw reaffirmed support to the GPEI by G8 leaders, who have discussed polio eradication at every Summit since first placing the item on their agenda in Kananaskis, Canada, in 2002. G8 leaders meeting in L'Aquila, Italy in July, committed to "work towards completing the task of polio eradication". Despite the political statements made by G8 leaders, there are stark differences in levels of financing between countries. The United States, United Kingdom, Germany, Japan and Canada led the way in 2009 in confirming additional financing to the Initiative. For the first time in the history of the Initiative, funding in 2009 from Rotary International and the Bill & Melinda Gates Foundation totalled more than the contributions from the G8. The year 2010 represents a crucial year for the Initiative with regards to the G8, whose Summit will be held in Muskoka, Canada.

Endemic Countries Continue to Provide Domestic Financing

Development partner financing continued to be substantially complemented by domestic financing from the remaining polio-endemic countries, as well as those suffering outbreaks due to importations. Of note, India has largely self-financed for the past several years, and in September 2009, re-affirmed its commitment by setting aside \$657 million in domestic resources for the 2010-2012 period. The Government of Nigeria in 2009 committed \$15 million and announced its intention to contribute \$20 million for 2010. The Government of Pakistan committed \$23 million in domestic financing for OPV for SIAs in 2009.

8.2 Donors

Austria contributed \$370,000 for polio eradication activities in Ethiopia, bringing its total support to \$2.88 million.

Bill and Melinda Gates Foundation announced in January a second \$255 million challenge grant to Rotary, which Rotary will match with \$100 million from its membership over the next three years. This contribution brings the Foundation's total contribution to the GPEI, including matching grants to Rotary International, to \$821 million.

Canada continued its strong support for the GPEI, disbursing \$29.27 million for Afghanistan and sub-Saharan Africa. Canada is the fifth-largest public sector donor to GPEI, having provided more than \$272 million.

In addition to its role as a spearheading partner, the **US Centers for Disease Control (CDC)** in 2009 provided funding for OPV, operational costs and programme support to UNICEF and WHO and continued to dispatch its epidemiologists, virologists and technical officers to assist polio-affected countries in implementing polio eradication activities. US Congress appropriations to the CDC for polio eradication in its fiscal year 2009 totalled \$101.2 million, bringing the CDC's total contributions to more than \$1.3 billion.

The **European Commission** disbursed \$900,000 in 2009 as part of its €1.4 million 2009-2010 contribution for Bangladesh, bringing its total contributions to \$193 million.

France provided \$2.65 million for polio eradication activities in Afghanistan. This contribution brings France's total support to the Initiative to \$39.27 million.

Germany continued to provide support to India through its development bank (KfW), providing \$70 million for OPV as well as \$7.5 million for laboratory support over the period 2009-2011. In addition, Germany provided \$82 million in a combination loan/grant, which the Government of India is using to strengthen cold chain and information systems. Although this lies outside of the GPEI budget for India, this contribution is recognized in Germany's total contribution to the Initiative. Germany's total support to the Initiative is \$378.77 million, making it the third largest public sector donor.

Italy, as host of the 2009 G8 Summit in L'Aquila and in response to the commitments made in the G8 communiqué, provided \$2.09 million in global unspecified funding. Italy's total support to the Initiative is \$36.92 million.

Japan continued to provide critical support for the procurement of OPV via UNICEF. In 2009, it provided \$21.44 million in OPV funding for Afghanistan, Pakistan, India and Nigeria as well as Democratic Republic of the Congo and Sudan. Japan is the fourth largest public sector donor to the Initiative, with contributions totalling over \$379 million.

Luxembourg continues to be the GPEI's largest per capita donor. Luxembourg contributed \$700,000 in 2009 as part of a multi-year commitment covering 2009-2013, bringing its total contributions to \$13.37 million.

Monaco contributed \$90,000 for activities in Niger, bringing Monaco's total funding for polio eradication activities in Niger to \$390,000.

The **Netherlands Ministry of Health** in 2009 provided \$120,000 to support polio work at the Dutch Institute of Public Health and the Environment, bringing the Netherlands' total contribution to polio eradication to \$113.22 million.

New Zealand provided \$70,000 for global polio eradication efforts through its partnership with local Rotary clubs in the country.

Norway continued to provide important unspecified contributions to the GPEI. In 2009, it provided \$8.7 million, bringing its total contributions to the GPEI to \$68.80 million.

Saudi Arabia provided \$1 million for OPV in Afghanistan, bringing its total support to \$4.13 million.

Slovak Republic made its first ever contribution of \$40,000 in 2009 for OPV in Afghanistan.

Spain contributed \$720,000 in 2009 as part of a multi-year commitment covering 2009-2011 for surveillance activities in Africa. This is Spain's first multi-year grant, which was complimented by \$1.3 million in additional unspecified funding. Since joining the Initiative in 2004, Spain has contributed \$13.18 million.

Rotary International, in addition to being a spearheading partner in the GPEI, also remains the largest private-sector donor. In January 2009, Rotary announced that it will match with \$100 million from its members over the next three years a second \$255 million challenge grant from the Bill and Melinda Gates Foundation. This brings Rotary International's matching commitment to \$200 million. In 2009, Rotary International disbursed \$101.00 million to the Initiative. By 2013, Rotary International will have contributed more than \$1.2 billion to the GPEI.

The **Russia Federation** disbursed \$5.06 million as part of its \$10 million multi-year commitment, bringing to \$28 million its funding to the Initiative since 2003.

For the third consecutive year, **Turkey** made a contribution to the GPEI in 2009. It provided \$50,000, bringing its total support to \$650,000.

The **United Kingdom's Department for International Development (DFID)** continued to play a critical financing role in the Initiative by bringing forward \$8.35 million (£5 million) to increase its 2009 instalment of its five -year £100million grant. This helped ensure that activities in outbreak countries in Africa took place. In 2009, DFID disbursed \$37.72 million in global support and specified funds for Pakistan. The UK is the second largest public sector contributor to the Initiative with total contributions of \$898 million.

The **United Nations Foundation (UNF)** in 2009 continued its support of the GPEI's resource mobilization efforts with a contribution of \$70,000. This funding brings the UNF's total support for the GPEI to over \$41.3 million.

US Congress in its fiscal year 2009 allocated \$32 million to the **United States Agency for International Development (USAID)** for polio eradication activities. Funds were used to support social mobilization, surveillance and laboratory activities, outbreak response and monitoring in priority countries, bringing USAID's total support to \$390 million.

World Bank Investment Partnership for Polio

In 2001, an innovative financing mechanism, commonly referred to as "IDA buy-downs", was developed to allow the use of credit issued by the International Development Association (IDA), the concessionary lending arm of the World Bank, for OPV procurement for polio eradication activities. Third-party donor funding (provided by the Bill & Melinda Gates Foundation, the CDC, Rotary International and the UNF) is used to "buy-down" IDA credits and turn them into grants. In 2009, a new \$75 million buy-down for Pakistan was signed for the period 2009-2011, complementing current buy-downs for Pakistan and Nigeria and bringing the total amount of the World Bank Investment Partnership for Polio funding to \$316.37 million.



Mr Bill Gates announces a joint financing commitment with Rotary International of \$355 million towards the global effort to eradicate polio.

Annex

Major expected results of Programme of Work 2009

	Programme of Work (Objectives)	Major expected result (Milestones)	Status • Achieved • In progress • Not achieved	Details
1.	Sustained implementation of core eradication strategies	>90% coverage in all infected and endemic areas, as verified by independent monitoring of finger-marked children	Not achieved	<p>In November 2009, the ACPE recommended that independent monitoring be conducted systematically in endemic and re-infected countries. In endemic countries the monitoring system is well developed. It demonstrates that certain areas of southern Afghanistan, Pakistan, and Nigeria, do not yet have consistent coverage >90% in SIAs. For re-infected countries, 2009 independent monitoring data shows that some countries achieved >90% coverage, but the quality of data for much of 2009 was uncertain. Since November 2009, a new system of monitoring is in place which allows for rapid feedback on monitoring data, the aim being to have accurate, useable data available globally within 15 days of the end of an SIA round.</p> <p>India: More than 99% of children in Bihar state were reached in 8 of 11 SIAs. In the other three SIAs, an average of 98% of children were reached. More than 98% of children in Uttar Pradesh were reached in 10 of 11 SIAs. In the other SIA, 97.8% of children were reached.</p> <p>Nigeria: 91% coverage, on average, in 10 highest-risk states in first half of 2009; improving to 93% coverage in the second half of 2009.</p> <p>Afghanistan: 87% coverage in house-to-house monitoring of December 2009 sub-national immunization day.</p> <p>Pakistan: 89.75% coverage on average. Karachi achieved 87% coverage, NWFP 93%, FATA 93% and Balochistan 86%.</p> <p>1 of 3 outbreak countries achieved 90% coverage in November SIAs.</p> <p>5 of 7 outbreak countries achieved 90% coverage in December SIAs.</p>

	Programme of Work (Objectives)	Major expected result (Milestones)	Status • Achieved • In progress • Not achieved	Details
2.	Evaluation of major barriers identified in the intensified polio eradication effort	Development and incorporation of area-specific plans to address the major barrier(s) to completing eradication in each endemic area and additional activities to limit international spread of polio	Achieved	<p>In 2009, the GPEI facilitated an <i>Independent Evaluation of Major Barriers to Interrupting Poliovirus Transmission</i>, in response to a request in January 2009 from the Executive Board of the World Health Assembly, prompted by delays in attaining global eradication. The <i>Independent Evaluation</i> comprised five sub-teams with a total of 28 experts in relevant disciplines including public health, immunization programmes, vaccinology, social mobilization and security. The teams evaluated the programme in Afghanistan, Angola, India, Nigeria, Pakistan, Sudan, regional offices for Africa and the Eastern Mediterranean and headquarters, with wide consultation with GPEI partners and stakeholders in each country.</p> <p>The <i>Independent Evaluation</i> expressed confidence that if the managerial, security and technical issues can be addressed, polio eradication can be achieved. Area-specific recommendations have been elucidated and incorporated into the <i>GPEI Strategic Plan 2010-2012</i> for endemic countries, re-established transmission areas and to limit the international spread of polio.</p>

3.	Programme of Work (Objectives)	Major expected result (Milestones)	Status	Details
			<ul style="list-style-type: none"> • Achieved • In progress • Not achieved 	
	Assessment of new strategic approaches in each endemic country:			
	Nigeria	By Q4 2009, the percentage of missed children during SIAs in each of the 10 highest-risk states in northern Nigeria will be reduced to <10% (from 21% in 2008).	In progress	In the last quarter of 2009, the average of zero-dose children across the 10 highest-risk states dropped to 5%. By the fourth quarter, only Kano and Bauchi states still had more than 10% zero-dose children.
	India	Adaptation of India SIA strategy based on outcomes of clinical trial	Achieved	2009 was a banner year for research in India resulting in major decisions for the India strategy. A tremendous amount of new information is now available on the immunogenicity of various polio vaccines and levels of population immunity in western UP from 2007-09. First, the bOPV clinical trial conducted in India demonstrated the non-inferiority of bOPV type 1/3 to corresponding mOPVs and to tOPV, paving the way for a recommendation by the Indian Expert Advisory Group (IEAG) for strategic use of bOPV in areas with circulation of types 1 and 3. Second, the Moradabad 5-arm vaccine trial showed that type 1 immunity in the key district of Moradabad has improved by over 15% since a previous survey conducted in 2007, confirming that multiple doses of mOPV1 can generate very high levels of immunity (99%) in one of the most challenging areas for polio in the world. The study also showed the substantial gaps in type 2 and 3 immunity, leading to decisions for increased tOPV and bOPV use in these areas. Finally, these studies highlighted areas for further research to be conducted in 2010 in order to better understand mucosal immunogenicity in these settings.

Programme of Work (Objectives)	Major expected result (Milestones)	Status • Achieved • In progress • Not achieved	Details
Pakistan	In all towns of Karachi, SIA coverage achieving 90% by Q4 2009, as verified by independent monitoring of finger-marked children	Not achieved	In the final two SIAs, finger-marking coverage of <5 year old children was less than 90% in 10 of 18 Karachi towns.
	In six highest-risk districts of NWFP/ FATA, proportion of zero-dose children reduced to <10% by Q4 2009, as verified per non-polio AFP data	Not applicable	Six highest-risk districts considered for analysis include three tribal agencies of FATA (Bajour, Mohmand and Khyber) and three districts of NWFP (Peshawar, Charsadda and Swat). Overall in 2009, the data provided showed that the proportion of zero-dose children among non-polio AFP cases aged six to 59 months was 8% (19/253). In the 4th quarter, it was 5% (2/44). However, the development and application of more detailed access-adjusted data in 2010 has revealed that greater than 20% of children in NWFP/ FATA were missed.
Afghanistan	By end-2009, proportion of missed children reduced to <10% in the 11 highest-risk districts of three provinces of Southern Region Hilmand, Kandahar and Uruzgan (from 18% at the start of 2009)	Not achieved	Post-campaign coverage monitoring in the 11 persistently infected districts in southern Afghanistan consistently showed that more than 10% of children were missed or not reached. However, access began to improve only in the latter part of 2009 and this indicator will continue to be monitored.

	Programme of Work (Objectives)	Major expected result (Milestones)	Status	Details
			<ul style="list-style-type: none"> • Achieved • In progress • Not achieved 	
4.	Development and evaluation of new tools	Bivalent OPV: licensing and introduction of at least two bOPV products by Q4 2009, if superiority is demonstrated to trivalent OPV in clinical trial	Achieved	bOPV was licensed in Q4 in Belgium by GSK and in India by Panacea Biotec Ltd; several license applications are pending.
		Intradermal IPV: completion of clinical trial and review by ACPE	Achieved	Three intradermal trials were completed, in Cuba, Oman and Moradabad, India, and reviewed by the ACPE. Follow-up clinical trials are ongoing in Cuba and planned in Oman.
		Seroprevalence surveys: seroprevalence surveys conducted in western Uttar Pradesh, India, and Karachi, Lahore and Peshawar, Pakistan	In progress	A seroprevalence survey was completed in Uttar Pradesh, India in 2009, and the survey is pending implementation in Pakistan in 2010.
		Real-time PCR: Roll-out of rT-PCR to all appropriate laboratories in the three WHO endemic regions by end-2009	Achieved	<p>Of 49 Intratypic Differentiation labs in GPLN:</p> <ul style="list-style-type: none"> • 42 equipped (21 of them through GPEI) • 39 with trained personnel • training workshops held in five WHO regions and in Russian Federation only in EURO region • personnel in 34 laboratories received training in 2009/2010 through PEI. Five others started through own initiative • 12 fully operational & passed the proficiency tests. Located in AFR (2), EMR (3), PAHO (1), SEAR (5), WPR (1).
		Targeted environmental surveillance: environmental surveillance established in Karachi, Pakistan	Achieved	Environmental surveillance started in mid-2009 in Karachi (and Lahore), Pakistan. Six sites established in Karachi and three in Lahore since July 2009. 74 samples tested, of which 22 contained wild poliovirus. 74 samples tested since mid-2009 and total WPV confirmed cases from 1 Jan 2009 to 11 May 2010: 22 (WPV1: 4, WPV3: 16, W1W3: 2).

	Programme of Work (Objectives)	Major expected result (Milestones)	Status	Details
			<ul style="list-style-type: none"> • Achieved • In progress • Not achieved 	
5.	Implementation of additional activities to limit international spread and stop outbreaks	Institutionalizing 24-month SIA plans in highest-risk countries:	Not achieved	All high-risk importation belt countries in west and central Africa have pre-planned SIAs for each year from 2010 to 2012.
		financing in place for first 12 months of 24-month SIA plan		By 30 June, the 2009 GPEI Programme of Work faced a US\$ 77 million gap against a US\$ 785 million budget, and a US\$ 320 million gap against a US\$ 1.43 billion budget for 2009-10.
		Independent, international assessment of outbreak response: independent assessments conducted in Angola, Chad and Sudan	In progress	As part of the GPEI <i>Independent Evaluation</i> referred to above, evaluation teams visited southern Sudan and Angola, and included these two countries in their report. Chad has not had an independent evaluation but will have a TAG meeting in May 2010. Such independent, international assessments of outbreak response are now systematic: any country that registers six months of continued wild poliovirus transmission will automatically result in an independent assessment of outbreak response.
		Outbreak response readiness plans: plans updated in all 15 countries in the 'wild poliovirus importation belt' in sub-Saharan Africa	In progress	As noted above, the importation belt countries are now pre-planning SIAs for each year between 2010 and 2012 to reduce the risk of outbreaks following importation.
		Polio immunization of travellers: ACPE recommendations published in WHO's <i>International Travel & Health</i>	Achieved	In November 2008, the ACPE urged WHO to amend its recommendations on immunization against poliomyelitis in <i>International Travel and Health</i> (ITH), to ensure that all travellers to and from countries affected by polio are fully immunized. In line with the ACPE recommendations, ITH were updated. Travellers who are resident in an area affected by the disease are now recommended to receive an additional dose of OPV between one and 12 months prior to each international journey.

	Programme of Work (Objectives)	Major expected result (Milestones)	Status <ul style="list-style-type: none"> • Achieved • In progress • Not achieved 	Details
6.	Assessment and strengthening of sub-national surveillance sensitivity	Areas with >12 months of undetected wild poliovirus transmission in the past five years: achieve non-polio AFP rate >2 per 100,000 in all provinces/states	In progress	By the end of 2009, achieved for Democratic Republic of the Congo, Angola, North Sudan and Chad (one sparsely populated province with <50,000 inhabitants). In South Sudan, all provinces have a non-polio AFP rate >1 per 100,000, with four out of 10 having a non-polio AFP rate >2 per 100,000.
		Areas at highest risk of importations: completion of at least two desk reviews and initiation of corrective measures as needed	Partially achieved	In 2009, desk surveillance reviews were conducted for the Horn of Africa, west and central Africa. Findings were shared with concerned parties and corrective measures taken. External AFP surveillance reviews were conducted in Indonesia, Kenya, Sudan, part of Nigeria, part of Pakistan and part of India.
		Rest of world: reviews conducted in each polio-free region, and results formally communicated to relevant Member States	Not achieved	Some reviews were carried out in polio-free regions in 2009; Regional Certification Commissions in the Western Pacific and Europe were active in maintaining the awareness of Member States. Further reviews are planned in 2010.
7.	Development of post-eradication policy	Characterising VDPV risks: at least two studies initiated to quantify iVDPV risks in low- and middle-income settings	Achieved	A total of 10 countries have initiated iVDPV studies.
		Risk management strategies: GAPIII finalized; initial mOPV stockpile tender awarded	In progress	The GAPIII has been finalized and is undergoing public comment; the stockpile tender has closed and will be evaluated shortly.
		'Affordable' IPV options and policy for low- and low-middle income countries: initiation of clinical development phase of Sabin-IPV project	Achieved	Trial lots have been produced and should be used in phase I trials in 2010.
		WHO position paper on polio immunization in the pre-eradication era drafted	Achieved	The WHO position paper has been drafted and is undergoing review.

	Programme of Work (Objectives)	Major expected result (Milestones)	Status	Details
			<ul style="list-style-type: none"> Achieved In progress Not achieved 	
8.	Finalization of multi-year Strategic Plan	Multi-year Strategic Plan: finalization of new five-year Strategic Plan by end-2009, for publication in January 2010	Achieved	GPEI Strategic Plan 2010-12 published following broad partner consultation and launched at a key stakeholders meeting in Geneva in June 2010.
		Financing: full financing of the 2009 GPEI Programme of work by June 2009	Not achieved	As at January 2009, there was a \$55 million funding gap for 2009, against a \$737 million budget. Due to the ongoing outbreak in the African Region, the budget in May was increased to \$785 million. As at May 2009, \$683 million was confirmed, leaving a shortfall of \$102 million. All funding required in 2009 was secured by the beginning of Q4.



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